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PARLIAMENT BUILDINGS, LONDON

COLLIER'S

NEW

ENCYCLOPEDIA

A LOOSE-LEAF AND SELF-REVISING REFERENCE WORK

IN TEN VOLUMES WITH 515 ILLUSTRATIONS
AND NINETY-SIX MAPS

VOLUME SEVEN

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"OCHRE—RESORCIN"

OCHRE, a combination of peroxide of iron with water; but the name is generally applied to clays colored with the oxides of iron obtained from the ferruginous mud separated from tin and copper ores; and it is also found in natural beds some feet thick. Ochres vary in color from a pale sandy yellow to a brownish red.

OCHS, ADOLPH S., an American newspaper publisher, born in Cincinnati, O., 1858; educated in the public schools of Knoxville, Tenn., where, after finishing his schooling, he began his business career by selling newspapers. Later he apprenticed himself to a printer and became a compositor on a local newspaper. In 1878 he ventured into the newspaper publishing field himself, acquiring ownership of the Chattanooga "Times," of which he is still the proprietor. In 1896 he purchased the New York "Times." He was also a director of the Associated Press.

OCHTMAN, LEONARD. Artist. Born at Zonnemaire, Zeeland, Holland, 1854, he was brought by his family to the United States at the age of 12 to reside at Albany, N. Y. His first work was a draughtsman in an engraving office, after which he had a studio for a couple of years, developing his talent in landscapes. He studied also for a time at the N. Y. Art Student's League, later traveling in Europe. Since 1882 he has exhibited at the National Academy of Design and elsewhere, and won many awards, including two gold medals at St. Louis. His moonlight scenes such as "Night on the Miamee River" are among his best.

OCLAWAHA ("crooked water"), a river of Florida, which after a very winding course of 275 miles flows into the St. John, about 25 miles S. of Palatka. Its banks are densely wooded, and the country so flat that the waters extend into the forest for a distance on either side.

OCMULGEE, a river rising in the central part of Georgia, running in a S. S. E. direction, passing the town of Macon, and ultimately uniting with the Oconee to form the Altamaha river, length about 200 miles.

OCONEE, a river in Georgia, which rises in Hall co., and unites with the Ocmulgee to form the Altamaha at Colquitt; is navigable about 100 miles.

O'CONNELL, DANIEL, called THE LIBERATOR OF IRELAND and THE GREAT AGITATOR, an Irish patriot; born in County Kerry, Ireland, Aug. 6, 1775. Educated at the Roman Catholic College of St. Omer, and the Irish seminary at Douay, a student of Lincoln's Inn, London, in 1794; was admitted to the bar in 1798; and speedily rose to a large and lucrative practice. In 1809, he became popularly known by his fervent advocacy of Catholic emancipation. In 1815, having in one of his diatribes stigmatized the corporation of Dublin as "beggarly," he was challenged by Alderman D'Esterre, and a hostile meeting took place in which the latter fell. He sat in the British

DANIEL O'CONNELL

House of Commons in 1828–1841, and became Lord Mayor of Dublin in 1841. The return of the Conservatives to power was the signal for renewed political agitation. Repeal of the Union was the object sought, and O'Connell headed the movement. A monster meeting to be held at Clontarf, Oct. 8, 1843, was estopped by the government, and O'Connell sentenced to pay a fine of $10,000, and to be imprisoned one year. This judgment was shortly after reversed by the House of Lords. The return of the Whigs to power in 1846, and O'Connell's avowed adherence to that party, brought him into unpopularity and he retired from public life. He wrote "Memoirs of Ireland." He died in Genoa, Italy, May 15, 1847.

O'CONNELL, DENNIS JOSEPH. American ecclesiastic. He was born at Charleston, S. C., and was educated at St. Charles' Seminary and St. Mary's College in his native city, and also in

Rome. In 1877 he was given the degree of S. T. D. at the college of Propaganda. After being ordained he became secretary to Cardinal Gibbons and later head of the American College in Rome. Later he was made rector of the Catholic University of America, holding that position till he was consecrated auxiliary bishop of San Francisco in 1909. Since 1912 he has been bishop of Richmond, Va.

O'CONNELL, WILLIAM HENRY, CARDINAL. Catholic prelate. Born at Lowell, Mass., in 1859, he graduated as B. A. from Boston College in 1881, after which he entered the American College at Rome, where he was ordained priest in 1884. He was appointed rector of the American College in Rome in 1895, named domestic prelate in 1897, and consecrated bishop of Portland, Me., at St. John Lateran, Rome, in 1901. In 1905 he was named assistant at the Pontifical Throne, and in the same year represented the Vatican at the court of the emperor of Japan, from whom he received the Grand Cordon of the Sacred Treasure. He was named archbishop of Constance and coadjutor with succession of Boston in 1906, and succeeded to the see of Boston in 1907, being made cardinal in 1911. In May, 1920, he represented the United States at the beatification in Rome of Oliver Plunkett.

O'CONNOR, ANDREW, an American sculptor. He was born at Worcester, Mass., in 1874, and received his preliminary education from his father and Daniel C. French. He has divided his home between the United States and Paris, and in 1906 received from the Paris Salon 2d medal—the highest award ever given to a foreigner. Among his decorative statues and reliefs the principal are: Central porch, St. Bartholomew's Church, N. Y.; 11 marble statues, Essex co. Court House, Newark, N. J.; bas-relief, Library of J. P. Morgan, N. Y.; General Liscum Monument, Arlington.

O'CONNOR, JOHN JOSEPH, an American ecclesiatic. He was born at Newark, N. J., in 1855, and graduated as A. M. from Seton Hall College in 1875. From there he went to the American College in Rome and the University of Louvain, where he studied divinity, being ordained priest in 1877. From 1878 to 1895 he was professor of philosophy and theology at Seton Hall College and Seminary. From 1895 to 1901 he was pastor at St. Joseph's, Newark, and was made bishop of Newark in 1901. With Cardinal O'Connell he went to Rome in 1920 to attend the beatification of Oliver Plunkett.

O'CONNOR, THOMAS POWER, an Irish journalist and politician, born in Athlone, Ireland, 1848; graduated from Queen's College, Galway, then for three years did newspaper work. Went to London, worked as journalist there, and in 1880 was elected to Parliament from Galway, becoming a strong Parnell man. In 1881 he toured the United States, lecturing on Ireland. Was elected president of the Irish National League of Great Britain in 1883. Was elected from Liverpool to Parliament six times. He founded several periodicals, the most famous of which is "T. P.'s Weekly." In 1906 he visited the United States again to raise money for the Home Rule monument.

O'CONOR, CHARLES, an American lawyer; born in New York City, Jan. 22, 1804; was admitted to the bar in 1824, while still a minor. Among his most celebrated cases were the Forrest divorce case; the Slave Jack case; the Lispenard will case; the Lemon slave case, and the Mme. Jumel suit; became senior counsel for Jefferson Davis when the ex-Confederate President was indicted for treason, and was conspicuous in the suits against William M. Tweed in 1871. In 1869 he was elected president of the Law Institute of New York; in 1872 was nominated for President of the United States by one of the numerous Democratic conventions of that year, despite his protest, and was defeated; and in 1876 appeared before the Electoral Commission in support of the claims of Samuel J. Tilden. He died in Nantucket, Mass., May 12, 1884.

O'CONOR, JOHN FRANCIS XAVIER, an American author and educator. He was born in New York in 1852, and graduated from St. Francis Xavier College in 1872, taking English studies in London, philosophy in Louvain, and Oriental studies at Johns Hopkins. He became a priest of the Jesuit Order in 1885, and taught at West Park College; Georgetown University; Boston College; St. Joseph's College, Philadelphia; St. Francis Xavier, N. Y., being founder also of Brooklyn College. Authority on cuneiform Assyrian. His works include dramas, of which he composed the music, among them the "Mystery of Life" (1916). He died in 1920.

OCRACOKE INLET, an inlet of North Carolina, forming a passage into Pamlico Sound, 22 miles S. W. of Cape Hatteras.

OCTAGON, in geometry, a polygon of eight angles or sides. A regular octagon is an octagon all of whose sides and

angles are respectively equal to each other.

OCTAHEDRON, in geometry, a solid contained by eight equal and equilateral angles. It is one of the five regular bodies.

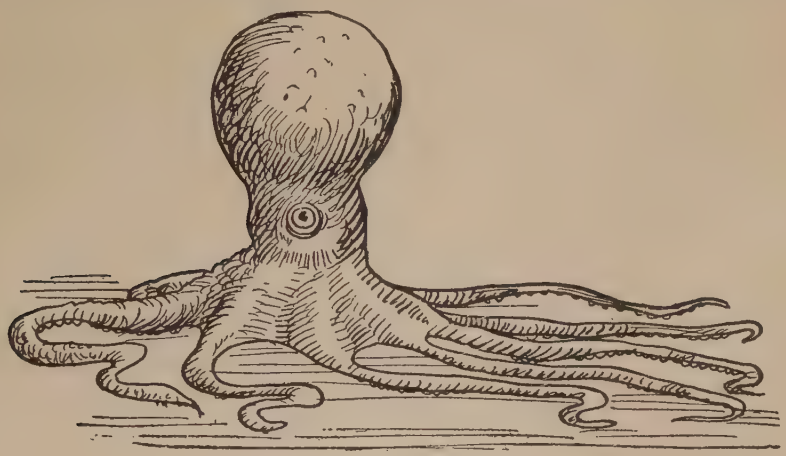
OCTANS ("the Octant"), the constellation surrounding and including the South Pole of the heavens, and one of the 14 added to the heavens by Lacaille in connection with his work at the Cape of Good Hope. Its brightest star is of the 3.8 magnitude. The star Sigma Octantis, of the 5.8 magnitude, lies at present within about ¾° of the South Pole, nearer than any equally bright star to the North Pole, and it is much used in the Southern Hemisphere for the determination of the azimuth of transit instruments. The constellation is surrounded by Hydrus, Mensa, Chamæleon, Musca, Triangulum australis, Apus, Pavo, Indus, and Tucana. See TRANSIT INSTRUMENT.

OCTAVIA, sister of Augustus, renowned for her beauty and purity of character, and practical wisdom. She was first married to Marcellus, a noble Roman of consular dignity, and soon after his death (40 B. C.), to Mark Antony. This marriage, it was hoped, would strengthen the new alliance between Octavius, her brother, and Antony, her husband. But Antony had seen Cleopatra, and he treated his wife with a contempt and cruelty which Octavius could not forgive, and which became the occasion of renewed war. When Antony set out for the East again, Octavia was not allowed to accompany him. She died in 11 B. C.

OCTAVO, the size of one leaf of a sheet of paper, which has been folded so as to make eight leaves; hence, applied to a book printed with eight leaves to the sheet. It is generally written 8vo, and varies in size according to the sizes of paper employed; as, foolscap octavo (or 8vo), imperial octavo (or 8vo), etc.

OCTOBER, the 8th month of the so-called year of Romulus, which became the 10th when Numa changed the commencement of the year to Jan. 1, though it retained its original name. Many Roman and Greek festivals were celebrated in this month, the most remarkable of which was the sacrifice at Rome of the October horse to the god Mars.

OCTOPUS, in zoölogy, the typical genus of the family *Octopodidæ*. The body is oval, warty, or cirrose, finless;



OCTOPUS

arms long, unequal, suckers in two rows, mantle supported in front by the branchial septum. In the male the third right arm is hectocotylized. Found on the coasts of the temperate and tropical zones. Forty-six species are known, varying in length from one inch to more than two feet. The females oviposit on seaweeds or in empty shells. They are sold in the markets of Smyrna and Naples, and India.

OCTROI, an old French term signifying a grant, privilege, or monopoly from government to a person or to a company. Also a tax levied at the gates of French cities, towns, etc.

ODD FELLOW, a member of the Independent Order of Odd Fellows, a secret fraternal society instituted in Eng-

land in the 18th century, and now having extensive lodges in Great Britain, Australia, Denmark, Switzerland, the United States, etc. Its organization is in lodges and encampments, grand lodges, grand encampments, and the Sovereign Grand Lodge of the World, and good moral character and belief in a Supreme Being are the requisite for membership. The first lodge in the United States was established in 1819; the grand lodges of the United States reported in 1914 a membership of 1,508,791. Pennsylvania, 137,751; New York, 126,294; Illinois, 105,062; Ohio, 87,788; Indiana, 87,044, etc. The Rebekah lodges admit to membership female relatives of the male members. There is also an organization of colored Odd Fellows, entitled the "Grand United Order of Odd Fellows of America."

Canada and the maritime provinces have a membership of 100,305. Australia, 45,300. The largest body is the Manchester Unity of Odd Fellows with a membership throughout the British Empire of 950,000. In the east, including South America, 18 Grand Lodges have been started among 22 nationalities, provinces and territories. In Europe lodges were founded in Germany 1876, Denmark 1878, Netherlands 1877, Switzerland 1871. In Cuba 1883, Mexico 1882.

ODE, a poem of lyrical character, supposed to express the poet's feelings in the pressure of high excitement, and taking an irregular form from the emotional fervency which seeks spontaneous rhythm for its varied utterance. The Greeks called every lyrical poem adapted to singing—hence opposed to the elegiac poem —an ode. The principal ancient writers were Pindar, Anacreon, Sappho, Alcæus, among the Greeks, and Horace among the Romans. As employed by English writers the ode takes either the Pindaric form of strophe, antistrophe, and epode irregularly arranged and contrasted; or, the form of a regular series of regular stanzas. The former style is found in Dryden's "Ode for St. Cecelia's Day," while the latter is seen in Shelly's "Ode to a Skylark." The masters of English poesy who have carried the ode to its highest achievements are Milton, Dryden, Collins, Grey, Coleridge, Wordsworth, Keats, and Shelley.

ODELL, BENJAMIN B., JR., an American public official; born in Newburgh, N. Y., 1854; studied in Bethany College, W. Va., and Columbia University. Entered party politics and in 1884 became member of the New York State Republican Committee, and chairman of its Executive Committee in 1898. Was a member of the United States House of Representatives from 1895 to 1899. Was governor of New York from 1901 till 1904. He was head of the party machine till 1905, when he was defeated as state chairman by Timothy L. Woodruff.

ODENBURG. See OEDENBURG.

ODENSE, a city of Denmark on the island of Funen, the capital of Odenseamt. It is the third city in population in Denmark and is situated on the Odense River. It is a well built city with all modern municipal improvements. It contains the cathedral of St. Canute, erected in the thirteenth century. Other important buildings are a castle, a large city hall and a handsome post office. There are several private and technical schools and two excellent libraries. The city is an important industrial and commercial center. There are manufactories of beer, liquors, glass, chemical products, machinery, textiles and sugar. Pop. about 45,000.

ODENWALD, a forest and chain of mountains in Western Germany, between the Neckar and the Main, in the territories of Hesse, Baden, and Bavaria. The Odenwald is about 50 miles in length, and presents charming scenery.

ODER, one of the principal rivers of Germany, rising in the Oderberg on the tableland of Moravia, 1,950 feet above the level of the sea, traversing Prussia, Silesia, Brandenburg, and Pomerania, then emptying into the Stettiner Haff, whence it passes into the Baltic by the triple arms of the Dievenow, Peene, and Swine, which enclose the islands of Wollin and Usedom. It has a course N. W. and N. of 550 miles, and a basin of 50,000 square miles. Canals connect the Oder with the Spree, the Havel, and the Elbe; the Warthe is the only tributary of importance for navigation. On the banks of the Oder are Ratibor, Breig, Breslau, Frankfort-on-the-Oder, Stettin, and Swinemünde.

ODESSA, a city and seaport of South Russia, on the N. W. coast of the Black Sea, half-way between the mouths of the Dniester and Bug. The harbor, which is artificial, is formed of two moles, and is capable of accommodating over 200 vessels. It is defended by two batteries toward the sea; and on the E. side is a citadel, which commands the town and port. The principal building is the cathedral of St. Nicholas. Facing the port is a large statue in bronze of the Duke de Richelieu. A great drawback is the scarcity of wood and water, and the in-

tensity of the heat, which frequently reaches 120°, and destroys the vegetation of the vicinity. Odessa is the emporium for the produce of Southern Russia, and owes its rapid growth to its being a free port. The great trade of the town and its principal export, is corn, which, garnered here from the adjacent Ukraine and Moldavia, is shipped to almost every part of Europe. Odessa was founded by Catherine II., in 1794. Pop. about 600,000. Odessa was the scene of anti-Jewish riots in 1905–1906, when many persons were killed. The mutinous Black Sea fleet also threatened the city. The port was closed during the Balkan War, 1912–1913. It was bombarded by a Turkish fleet in the World War in 1914.

ODIN. See WODEN.

ODOACER, the first barbarian King of Italy, son of one of Attila's officers; born about 434. He entered into the Imperial guards, in which he rose to an honorable rank. In 476 he was chosen chief of a confederate army, and was saluted by them King of Italy. He defeated the patrician Orestes at Pavia, banished his son, Romulus Augustus, last Roman emperor, and made Ravenna the seat of his kingdom. In 489, Theodoric, King of the Ostrogoths, invaded Italy, and Odoacer was three times defeated. He made a treaty with Theodoric, by which they were to rule jointly. But after a few days, Odoacer was assassinated by his conquerer, March 5, 493.

ODOMETER, an instrument employed for registering the number of revolutions of a carriage wheel, to which it is attached.

O'DONAGHUE, DENIS, an American Roman Catholic bishop, born in Daviess co., Ind., in 1848. He was educated at Meinrad's College and at St. Thomas' Seminary, after studying theology at the Grand Seminary, Montreal. He became a priest in 1874 and was appointed assistant priest of St. John's Church, Ind. For 21 years he was chancellor of Vincennes Diocese, and from 1895 to 1910 was rector of St. Patrick's Church, Ind. He was made auxiliary bishop in 1900 and was appointed bishop of Louisville, Ky., in 1910.

ODONATA. See DRAGON FLY.

O'DONNELL, LEOPOLD, a Spanish military officer; born in Santa Cruz, Teneriffe, Jan. 12, 1809. He was descended from an ancient Irish family, entered the Spanish army and espoused the cause of the infant Queen Isabella against Don Carlos (see CARLISTS). When the Carlists were overthrown he was created Chief of the Staff to Espartero. He took the side of the queen-mother in 1840, emigrated with her to France. In 1843 his intrigues against Espartero were successful; and he was rewarded by the governor-generalship of Cuba. When he returned to Spain (1848) he intrigued against Bravo Murillo and Narvaez; was made war minister by Espartero in 1854; but plotted against his benefactor, and in 1856 supplanted him by a coup d'état. He was in three months' time succeeded by Narvaez, but in 1858 he returned to power; in 1859 he commanded the army in Morocco, took the Moorish camp, and the city of Tetuan surrendered, whereupon he was made Duke of Tetuan. In 1866 his cabinet was upset by Narvaez, and he died in Bayonne, France, Nov. 5, 1867.

O'DONOVAN, WILLIAM RUDOLF, an American sculptor, born in Preston co., Va., in 1884. He served in the Confederate Army and after the war established a studio in New York City, where he executed many portrait busts of well-known people, including Walt Whitman, General Wheeler and others. He also made statues of Washington for Caracas, Venezuela, and many monuments and statues for American cities and institutions. He was one of the founders of the Tile Club.

ODONTOGLOSSUM, an extensive genus of orchids, natives of Central America, much prized by cultivators for their magnificent flowers, which are remarkable both for their size and the beauty of their colors. A considerable number of species have been introduced into Europe.

ODYSSEY, a celebrated epic poem attributed to Homer, and descriptive of the adventures of Ulysses in his return home from the siege of Troy.

ŒCUMENICAL, universal, an epithet applied to the general councils of the Church. From the time of the Council of Chalcedon (451) the patriarchs of Constantinople took the title of œcumenical, in the same sense as the epithet Catholic is used in the Western Church. See COUNCIL.

ŒDEMA, a swelling occasioned by the presence of water which collects in the interstices of the cellular tissues. The subcutanous cellular tissue is the most frequent, but not the only seat of œdema. The other forms are œdema of the lungs and of the glottis. Œdema of the brain is of less frequent occurrence, and œdema of the sub-mucous and subcellular tissue seldom produces symptoms

sufficiently decisive to determine their nature.

OEDENBURG, a town of Hungary, on an extensive plain, 3 miles W. of the Neusiedler See and 48 miles S. by E. of Vienna. It is one of the most beautiful towns in Hungary, and has manufactures of candied fruits, sugar, soap, etc., and a large trade in wine, corn, and cattle, the neighborhood being rich and well cultivated. The Roman town of Scarabantia here was one of considerable importance. Pop. about 35,000.

ŒDIPUS, in Greek legend the son of Laius, King of Thebes, who, after being married to Jocasta, consulted the oracle, which informed him that he was doomed to die by the hand of his own son. To prevent so fearful an accident, he ordered his wife, as soon as Œdipus, the child was born to destroy him. She secretly sent the child away, by a confidential servant, with a command to expose it in some place where it would meet with a protector—instead he bored the feet of the child and hung him on a tree on Mount Cithæron. He was discovered by a shepherd, who carried him home and adopted him as his own son. As he grew up, the talent he displayed enabled him to outstrip all his companions who taunted him with the baseness of his birth. Doubting the truth of the information as to his being illegitimate, Œdipus, so called on account of the deformity of his feet, resolved to proceed to Delphi to consult the oracle, and was told that if he returned to his home he would become his father's murderer. Knowing no father but the man who had adopted him, he turned from Corinth and, in a narrow pathway, he met his father Laius in his chariot. Being insolently ordered to make way, and refusing, a contest ensued, in which the decree of the oracle was verified by Œdipus slaying both Laius and his attendant. Proceeding to Thebes, he was attracted by the enigma proposed by the Sphinx, and which he determined to solve—as Creon, who had succeeded Laius, promised any one who should succeed in doing so the crown of Thebes as a reward. The enigma was this: "What animal in the morning walks on four feet, at noon on two, and in the evening on three?"—which Œdipus explained by saying it was man, who, in his infancy, or in the morning of his life, crawls on his hands and feet; in his manhood, or the noon of his age, he stands erect and goes on two feet; and in old age, or the evening of his days, he supports his trembling limbs with a staff. This being the true explanation resulted in the death of the Sphinx, and the accession of Œdipus to the throne of Thebes, he marrying Jocasta, his own mother. In his endeavors to find the murderer of Laius, he first became aware that the stranger he had encountered and killed was his father. His remorse was so great that he voluntarily deprived himself of sight and banished himself from his kingdom.

OELAND, a long and narrow island in the Baltic, 4 to 17 miles from the E. coast of Sweden. It is 55 miles long and 5 to 12 broad. Scarcely more than a limestone cliff, scantily covered with soil, but in some parts well wooded, and has good pasture ground; there are large alum works; and the fishing is excellent.

OEREBRO, a town of Sweden, at the entrance of the Svarta into the Hjelmar Lake, 170 miles W. of Stockholm. It has an ancient castle, in which many diets have been held; and there is a trade in minerals and matches. Pop. (1917) 34,667.

OESEL, an island in the Baltic belonging to the Republic of Esthonia, and lying across the mouth of the Gulf of Riga; length about 45 miles; area, 1,000 square miles; pop. about 60,000. The surface is undulating, broken by low hills, marshy, watered by numerous small streams, and well wooded. The coast is generally formed by high cliffs. The climate is milder than that of the neighboring continental districts. The only town is Arensburg, on the S. E. coast. Many of the inhabitants of Arensburg are of German descent, as are the nobles and the clergy of the island; but the peasantry are Esthonian. Long governed by the Teutonic knights, it became a Danish province in 1559, was given up to Sweden in 1645, and in 1721 fell into the hands of Russia. Capital Arensburg. Pop. 5,000. Island population 66,000, chiefly Esthonians.

ŒSOPHAGUS, in anatomy, a slightly flexed canal, between the pharynx and the stomach, inclining to the left in the neck, the right in the upper thorax, and the left again through the posterior mediastinum. It is narrow and flat in the neck, and rounded in the lower and longest part. It passes through the diaphragm, and terminates nearly opposite the 10th dorsal vertebra in the cardiac orifice of the stomach. The passage of the food is caused by muscular contraction through the action of the parvagum nerve.

OFFA, a King of Mercia, who attained the throne after Ethelbald, on defeating the usurper Beornred, A. D. 757. He brought Kent under his sway, and re-

duced the power of Wessex by a defeat inflicted in 777. He also defeated the Welsh, took from them part of their border lands, and to keep them within their new limits erected here the ramparts known as Watt's Dyke and Offa's Dyke. Latterly he murdered Ethelbert, King of East Anglia, and seized his kingdom. He founded the Abbey of St. Albans, and was a liberal patron to the Church. He died in 796.

OFFA'S DYKE, an entrenchment extending along the border of England and Wales, from the N. coast of Flintshire, on the estuary of the Dee, through Denbigh, Montgomery, Salop, Radnor, and Hereford, into Gloucestershire, where its S. termination is near the mouth of the Wye. In some places it is nearly obliterated by cultivation; in others it is of considerable height. Nearly parallel with it, about 2 miles to the E., is Watt's Dyke, which, however, seems never to have been so great a work. Offa, King of Mercia, is said to have erected Watt's Dyke in 765 to keep back the Welsh, and Offa's Dyke a few years later.

OFFENBACH, a manufacturing town of Hesse-Darmstadt, on the S. bank of the Main, 5 miles S. E. of Frankfort. Before the World War among its industrial products were chemicals, fancy leather goods, machines, and carriages. The schloss was a residence of the princely house of Isenburg-Birstein. Pop. about 80,000.

OFFENBACH, JACQUES, a French composer of opera bouffe; born of Jewish parents in Cologne, June 21, 1819. He went to Paris in 1833, and settled there, becoming orchestra leader in the Théâtre Français in 1848, and manager of the Bouffes Parisiennes in 1855. Offenbach composed a vast number of light, lively operettas, "Marriage by Lanterns"; "Elezondo's Daughter"; etc.; but the productions by which he is best known are a series of burlesque operas, in virtue of which he must be regarded as the inventor of the modern form of opera bouffe. Among the most notable are: "Orpheus in Hades" (1858); "La Belle Hélène"; "Bluebeard"; "The Grand Duchess"; "Genevieve of Brabant"; and "King Carotte." "Madame Favart" (1878) became almost as popular in England and the United States as in France. He died in Paris, France, Oct. 5, 1880.

OFFICE BUILDINGS. The construction of edifices designed for purely commercial uses has in modern times reached a development that has made it a field for architecture paralleling the erection of cathedrals in the Middle Ages. In this development America has greatly surpassed the countries of Europe, where the use of former dwellings for business purposes, and the use of dwellings for residences and business combined is still largely in vogue. Banks and insurance companies, and enterprises of a similar kind, to whom a prosperous façade was an advertising asset, were the first to use special structures, but the giant progress of modern business has made the building of great edifices like the Equitable and Woolworth buildings of New York a necessity. The development of the elevator and steel frame has made such building the last word in convenience.

OGDEN, a city and county-seat of Weber co., Utah; at the junction of the Weber and Ogden rivers, and on the Oregon Short Line, the Southern Pacific, the Rio Grande Western, the Salt Lake and Ogden and the Union Pacific railroads, 37 miles N. of Salt Lake City. It is the seat of the Weber Stake Academy (Mormon), Sacred Heart Academy, the State Industrial School, the State School for the Blind, and the State School for the Deaf and Dumb. Here are street railroads, electric lights, National and private banks, parks, and several daily and weekly newspapers. The industries comprise mining, iron founding, flour and lumber milling, brewing, and the manufacture of boots and shoes, woolen goods, brooms, vinegar, and other commodities. In Ogden Canon are large powder works and also the city's electric light plant. The streets are wide and well kept, and the buildings substantial. Pop. (1910) 25,580; (1920) 32,804.

OGDEN, ROBERT CURTIS, an American capitalist and merchant; born in Philadelphia, Pa., 1836; died New York City, 1913. He was educated in a private school and at Yale. From 1885, until he retired, in 1907, he was a member of the firm of John Wanamaker. During his life he was much interested in education and was a trustee of Tuskegee Institute, in Alabama, president Southern Education Board, Conference for Education in the South, and president and trustee of Hampton Institute.

OGDEN, ROBERT MORRIS, an American educator, born in Binghamton, N. Y., in 1877. Graduated from Cornell University in 1901 and afterward studied in Germany. He was associate professor of psychology in the University of Missouri in 1903-1905, and was associate professor and professor of psychology and philosophy at the University of Texas, from 1909 to 1914. In latter years he

was appointed professor of psychology in the University of Kansas, serving till 1916, when he became professor of education of Cornell University. He is a member of many psychological and philosophical societies and wrote and translated many works on psychology.

OGDEN, ROLLO, an American journalist, born Sand Lake, N. Y., 1856; educated Williams College and Union Theological Seminary and in 1881 was ordained a Presbyterian minister. For two years he was a missionary in Mexico City, then became pastor of the Case Avenue Church, Cleveland, Ohio. In 1887 he began his journalistic work in New York City, becoming editor of the New York "Evening Post" in 1903. In 1920 he left the "Post" to assume the associate editorship of the New York "Times."

OGDENSBURG, a city and port of entry in St. Lawrence co., N. Y.; at the confluence of the St. Lawrence and the Oswegatchie rivers, and on the New York Central and Hudson River and Rutland railroads; 175 miles N. N. W. of Albany. The city has a large river trade, and a steam ferry to Prescott, Canada; contains a United States government building, refuge for the aged, orphanage, academy, hospital, public library, street railroad and electric light plants, National and State banks, daily and weekly newspapers and many fine public and private buildings. It has grain elevators, flour and lumber mills, leather factories. Manufactures of silk, curtain rods, clothing. Pop. (1910) 15,933; (1920) 14,609.

OGEECHEE, a river in Georgia which rises in Greene co., and empties into Ossabaw Sound, 17 miles S. of Savannah; length, about 200 miles. It is navigable for steamers in its lower waters.

OGG, FREDERICK AUSTIN, an American economist, born at Solsberry, Ind., in 1878. Graduated at DePauw University in 1899 and took post graduate courses at other universities. After several years spent in teaching in high schools and colleges, he became associate professor of political science at the University of Wisconsin in 1914, and full professor in 1917. He was a member of many economic and historical societies and was associate editor of the "American Political Science Review." He wrote "Saxon and Slav" (1903); "A Source Book of Mediæval History" (1908); "Life of Daniel Webster" (1914); "National Progress 1907-1917" (The American Nation, Vol. 27, 1917).

OGLESBY, RICHARD JAMES, an American lawyer; born in Oldham co., Ky., July 25, 1824. He was admitted to the Illinois bar in 1845. He served as a 1st lieutenant in the Mexican War; in 1849 was among the goldseekers who made the overland trip to California, engaging in mining for two years. In 1851 he returned to Illinois and resumed law practice; was elected State Senator in 1860, but resigned to enter the army in the Civil War. He was colonel of the 8th Illinois Volunteers, and later Major-General. He was three times governor of Illinois, being first elected in 1864, re-elected in 1872, and again in 1885. He was elected United States Senator in 1873 and served six years. He died in Elkhart, Ind., April 24, 1899.

OGLETHORPE, FORT, a defensive structure erected by General Oglethorpe in 1737, on St. Simon's Island, Ala., near the mouth of the Alabama river. It was the scene of considerable fighting during the Revolution, as well as the War of 1812. Now in ruins.

OGLETHORPE UNIVERSITY, an institution under the control of the Southern Presbyterian Church, situated at Atlanta, Ga. The first university of this name was founded in 1835, but the stress of the Civil War and Reconstruction period proved too great for its resources and it was forced to close its doors in 1872. After the lapse of a few years the present university assumed its place. Among the graduates from 1835–1872 were many theologians, governors of the state and more famous than all, Sidney Lanier, the poet. The endowment of the present institution is about $1,000,000 which is under the control of a board of directors, every member of which must be a Presbyterian.

OGLIO (ōl'yō), a river of Northern Italy which rises in the Alps, drains Lake Iseo, and falls into the Po; length, 150 miles.

O'GORMAN, JAMES ALOYSIUS, United States Senator from New York; born in New York City, 1860; educated in the College of the City of New York and was admitted to the bar in 1882. From 1893 to 1900 he was a justice of the District Court of New York, then justice of the Supreme Court of New York. In 1911 he was elected to the United States Senate, whereupon he resigned from the bench. His term ending in 1917, he resumed law practice. In 1912 he was a delegate to the National Democratic Convention.

O'GORMAN, THOMAS, an American clergyman; born in Boston, Mass., May

LAKE ERIE
ONTARIO
MICHIGAN
INDIANA
OHIO
KENTUCKY
WEST VIRGINIA
PENNSYLVANIA
LAKE ST. CLAIR
Detroit
Toledo
Cleveland
Sandusky
Akron
Canton
Youngstown
Cincinnati
Dayton
Springfield
Columbus
Zanesville
Portsmouth
Marietta
Steubenville
Mansfield
Lima
Findlay
Fremont
Elyria
Lorain
Ashtabula
Warren
Alliance
Massillon
Salem
East Liverpool
Wheeling
Martins Ferry
Bellaire
Moundsville
Pt. Pleasant
Ripley
Ironton
Huntington
Portsmouth
Maumee Bay
Pte. Pelee
Pte. aux Pins
Put-in-Bay
Kelleys Island
South Passage
North Passage
Middle Passage
Sandusky Bay
Huron
Vermilion
Rocky River
Lake Erie
Ohio River
Scioto R.
Kanawha R.
Big Sandy R.
Guyandotte R.
Little Kanawha R.
Hocking R.
Muskingum R.
Scioto R.
Miami R.
Auglaize R.
Maumee R.
Portage R.
Sandusky R.
Huron R.
Vermilion R.
Black R.
Rocky River
Cuyahoga R.
Grand R.
Ashtabula R.
Conneaut
Erie
Pennsylvania
New York
Ontario
Michigan
Indiana
Ohio
Kentucky
West Virginia
Pennsylvania
Albion
Jackson
Ann Arbor
Ypsilanti
Wayne
Chelsea
Windsor
Roudeau Harbor
Essex Jo.
Amherstburg
Leamington
Jonesville
Hillsdale
Carleton
Dundee
Monroe
Raisin Pt.
Reading
Adrian
Bliss field
Pte. Pelee I.
I. St. George
N. Bass I.
Middle Bass I.
S. Bass I.
Catawba Island
Gypsum
Marblehead
Beach Park
Lorain
Avon
Amherst
Vickery
Castalia
Sandhill
Milan
Berlin Heights
Monroeville
Norwalk
Collins
Wakeman
Lagrange
Wellington
Litchfield
Mallet Creek
Medina
Chatham
Spencer
Rochester
Homerville
Lodi
Wadsworth
Seville
Sullivan
Nova
Chicago
Greenwich
New Haven
Plymouth
Shiloh
Savannah
Wakin
Polk
Ashland
Pavonia
Lexington
Newville
Bellville
Butler
Loudonville
Mohican
Perrysville
Hayesville
Jeromeville
Ashland
Orrville
Smithville
Overton
Creston
Doylestown
Inland
Canal Fulton
Hartville
Sebring
Greenford
Washingtonville
Columbiana
Calla
Petersburg
Leetonia
Homeworth
East Palestine
Rogers
Lisbon
Minerva
Malvern
Salineville
Mechanicstown
Wellsville
Irondale
Bergholz
Toronto
Steubenville
Richmond
Jefferson
Martins Ferry
Bellaire
Moundsville
Powhatan
Barnesville
Jacobsburg
Senecaville
Somerton
Batesville
Beallsville
Woodsfield
Clarington
Roundbottom
Monroe
Antioch
Hannibal
Sardis
Jolly
New Martinsville
Carter
Lower Salem
New Matamoras
Whipple
Lowell
Watertown
Chesterhill
Jacksonville
Millfield
Bartlett
Utley
Cutler
Bastow
Newport
Reno
Marietta
Pennsboro
Smithton
Parkersburg
Kanawha
Cairo
Elizabeth
Glenville
Ravenswood
Ripley
Buffalo
Winfield
Point Pleasant
Letart Falls
Bidwell
Cheshire
Kyger
Racine
Portland
Middleport
Pomeroy
Minersville
Syracuse
Carpenter
Dyesville
Reedsville
Flora
Rockland
Athens
Stewart
Hockingport
Shade
Albany
Zaleski
Vinton
Creola
Luhrig
Laurelville
Union Furnace
Millfield
Jacksonville
Chesterhill
Whipple
Lowell
Watertown
Stockport
Deavertown
Reinersville
Caldwell
Stafford
Dexter Cy.
S. Olive
Malta
McConnelsville
Congo
Shawnee
Corning
Logan
Rockbridge
Gore
Straitsville
Coalton
Wellston
Jackson
Given
Pikeon
Beaver
Coal Grove
Proctorville
Chesapeake
Ashland
Catlettsburg
Kenova
Guyandotte
Huntington
Ceredo
Kenova
Webbville
Grayson
Carter
Flemingsburg
Hillsboro
Morehead
Carlisle
Paris
Georgetown
Cynthiana
Falmouth
Williamstown
Maysville
Vanceburg
Aberdeen
Manchester
Portsmouth
West Union
Blue Creek
Bentonville
Ripley
Moscow
Felicity
Higginsport
Georgetown
Decatur
Russellville
Winchester
Cherry Fork
Locust Grove
Sardinia
Bethel
Lindale
Laurel
Feesburg
Batavia
Williamsburg
Mt. Orab
Mowrystown
Sinking Spring
Amelia
Newport
Covington
Cincinnati
Walton
New Richmond
Milford
Norwood
Mt. Healthy
Glendale
Sharonville
Loveland
Miamiville
Edenton
Fayetteville
Hillsboro
Rainsboro
Lynchburg
New Vienna
Midland
Blanchester
Clarksville
Wilmington
Good Hope
Sabina
Port William
Waynesville
Harvey sburg
Xenia
Springvalley
Milledgeville
Bowersville
Jamestown
Jeffersonville
Madison Mills
Bloomingburg
Circleville
Williamsport
New Holland
Washington C.H.
Frankfort
Kingston
South Bloomingville
New Plymouth
Eagle Mills
Creola
Bourneville
Waller
Bainbridge
Richmond Dale
Chillicothe
Greenfield
Lyndon
Cuba
Morrow
Kings Mills
Oxford
College Cor.
Somerville
Seven Mile
Excello
Lebanon
Franklin
Middletown
Hamilton
Okeana
West Chester
Shandon
Harrison

1, 1843; was educated in the United States and France; received the degree of D.D. directly from Pope Leo XIII. in 1893; and was consecrated Roman Catholic Bishop of Sioux Falls, April 19, 1896. He held pastorates at Rochester, Minn. (1867–1878); at Faribault, Minn. (1882–1885); was first president of the College of St. Thomas, St. Paul, Minn.; and professor at the Catholic University of America, Washington, D. C. He wrote, "A History of the Roman Catholic Church in the United States." In 1902 was appointed by President Roosevelt a member of the Commission to the Vatican to discuss Philippine religious questions.

OGOWÉ, or OGOWAY, a river of West Africa, rising on the W. side of the watershed that parts its basin from that of the Kongo, in lat. 2° 40′ S., lon. 14° 30′ E., flows W. N. W., and finally curves round by the S. so as to pour its waters into Nazareth Bay, on the N. side of Cape Lopez. It forms a wide delta of about 70 square miles in extent. In the dry season (July to September) it shrinks to a narrow current; at other times it is a deep, broad stream, islands and sandbanks and shallows prevent vessels of any size from ascending. It has been dominated by France, through her colony on the GABOON (*q. v.*), since 1885.

OGYGES, said to have been the first King of Attica and Bœotia, in the 18th century B. C. In his reign is stated to have occurred the great deluge that covered the whole of Greece. That event has been placed as occurring 260 years before that of Deucalion; viz., about 1764 B. C.

O'HARA, THEODORE, an American lawyer, author of the poem "The Bivouac of the Dead"; born in Danville, Ky., in 1820. He was a lawyer and journalist; at one time an officer in the United States navy; connected with the Lopez and Walker movements; served as captain and major in the Mexican War; afterward, for a year, in the United States cavalry; and in the Civil War as a colonel on the Confederate side. He died in Barbour co., Ala., June 7, 1867.

O'HIGGINS, a province of Chile with an area of 2,342 square miles. The eastern part of the slope of the Andes is very mountainous. It has a large area suitable for grazing, in the western part. Agriculture and grazing are the chief industries. Some mining of gold and other metals is carried on in the mountain regions. Pop. (1917) 120,750. The capital is Rancagua.

O'HIGGINS, HARVEY J., an American writer, born in London, Ont., in 1876. He studied in the University of Toronto from 1893 to 1897. He wrote "The Smoke Eaters" (1905); "The Beast and the Jungle" (with Judge Ben B. Lindsey) (1910); "The Dummy" (1913), and "Mr. Lazarus" (1916); "From the Life" (1919).

OHIO, a State in the North Central Division of the North American Union; bounded by Michigan, Lake Erie, Pennsylvania, West Virginia, Kentucky, and Indiana; admitted to the Union, Feb. 19, 1803; capital, Columbus; number of counties, 88; area, 41,040 square miles; pop. (1890) 3,672,316; (1900) 4,157,545; (1910) 4,767,121; (1920) 5,759,394.

Topography.—The surface of the State is an undulating plain with a tranverse ridge crossing it in a N. E. and S. W. direction just N. of the center of the State. This ridge forms the watershed between those rivers belonging to the St. Lawrence, and those of the Ohio river systems. The highest altitude in the State is near Bellefontaine, in Logan county, 1,550 feet. The N. side of the watershed, though smaller, has a more gentle slope than the S. side. The lands in the N. W. were originally swampy. The Ohio river forms over half the E., and the entire S. boundary of the State, and though it has an average descent of eight inches to the mile, is navigable its entire distance along the State. Lake Erie forms over two-thirds the N. boundary and provides Ohio with several excellent harbors. The principal rivers flowing into the lake are the Cuyahoga, whose mouth forms the harbor of Cleveland; the Black, the Vermilion, the Ottawa, the Sandusky, emptying into Sandusky Bay, and the Maumee, emptying into Maumee Bay. All of these rivers have excellent harbors at their mouths. The Maumee river drains the larger portion of the N. of Ohio. The streams flowing into the Ohio are the Muskingum, emptying at Marietta; the Scioto, at Portsmouth; the Little Miami, 6 miles from Cincinnati; the Big Miami, 20 miles below Cincinnati, and the Hocking.

Geology.—The entire geological formation of Ohio consists of Palæozoic strata, having an average thickness of about 3,500 feet. The Carboniferous, Devonian, and Silurian systems form the surface rock of the State. The Quaternary or drift deposits, cover a large area of the State, consisting of a blue bowlder clay, covered by the Erie clay. The Carboniferous deposits cover one-third the surface, overlying the Devonian, which geologically forms the surface of the N. part of the State. The whole S.

E. half of Ohio is underlaid with coal measures, showing seven distinct veins of superior coal, for gas making, or iron smelting. These coal measures have a practical working thickness of over 50 feet.

Mineralogy.—The mineralogical resources of Ohio are very extensive. The State ranks ninth in the United States in the production of petroleum, and clay products; fourth in coal and natural gas; and fourth in salt. Iron is found in several counties, and is adapted to fine class castings. Carbonate of lime, hydraulic cement, and quicklime are extensively manufactured. The sandstone near Cleveland is used extensively for building purposes in the N. States and Canada. Ohio is one of the most important of the mineral producing States. Its two leading products are coal and clay products. There were produced in 1919 47,919,202 short tons of coal. The petroleum produced in the same year amounted to 7,825,226 barrels, valued at $10,061,493. The natural gas production was valued at $17,391,060. The value of the products of the quarries, chiefly sandstone and limestone, was $5,816,923. The Portland cement produced was 1,983,217 barrels, valued at $1,940,824. The value of the clay products was $36,839,621.

Manufactures.—There were in 1914 15,658 manufacturing establishments, employing 510,435 wage earners. The capital invested was $1,677,552,000, and the amount paid in wages was $318,924,000. The value of the materials used was $1,020,782,000 and the value of the finished product was $1,782,808,000.

Soil and Agriculture.—The soil is divided into three grades, limestone soils, clay of the uplands, and swamp lands in the N. W. The former two are well adapted to agriculture, all the fruits, cereals, and vegetables of the temperate zone thriving well. The following figures give the acreage, production and value of the principal crops, in 1919: corn, 3,700,000 acres, production, 162,800,000 bushels, value $196,988,000; oats, 1,548,000 acres, production 51,858,000 bushels, value $37,338,000; wheat, 2,860,000 acres, production 54,440,000 bushels, value $115,413,000; hay, 2,879,000 acres, production 3,973,000 tons, value $86,611,000; tobacco, 90,000 acres, production 77,400,000 pounds, value $26,000,084; potatoes, 150,000 acres, production 9,300,000 bushels, value $17,856,000.

Banking.—On Oct. 31, 1919, there were reported 372 National banks in operation, having $65,033,000 in capital, $45,949,000 in outstanding circulation, and $156,342,000 in United States bonds. There were also 609 State banks, with $58,417,000 capital and $39,138,000 surplus; 169 private banks, with $2,657,000 capital, and $990,000 surplus. The exchanges at the United States clearing houses at Cincinnati, Cleveland, Columbus for the year ending Sept. 30, 1919, aggregated $8,780,512,000.

Education.—School attendance is compulsory for children from 6 to 15 years. There were in 1919 about 11,000 public elementary schools, with about 30,000 teachers and about 870,000 enrolled pupils. There were over 1,000 public high schools, with nearly 130,000 pupils, and 6,500 teachers. There were 5 State normal schools, with about 1,200 students. The total expenditure for education exceeds $55,000,000 annually. Among the colleges are the University of Cincinnati, at Cincinnati; Western Reserve University, at Cleveland; Ohio State University, at Columbus; Ohio Wesleyan University, at Delaware; Oberlin College, at Oberlin; St. Xavier College, at Cincinnati, Oxford and Western Colleges, at Oxford, and the Lake Erie College and Seminary at Painesville.

Churches.—The strongest denominations in the State are the Roman Catholic; Methodist Episcopal; Presbyterian; Regular Baptist, North; Disciples of Christ; United Brethren; Lutheran, Independent Synods; Reformed; Congregational; German Evangelical Synod; and Christian.

Railways.—The total mileage in 1919 was 9,316. There were in addition over 4,300 miles of electric railway track.

Finances.—The receipts for the fiscal year ending July 1, 1918, were $25,411,743. The disbursements were $33,199,499. The cash on hand at the beginning of the year amounted to $7,787,756. There was a balance on July 1, 1919, of $7,375,351. The public debt amounted to $1,665, being a canal loan not bearing interest.

State Government.—The governor is elected for a term of two years. Legislative sessions are held biennially and limited in length to 60 days each. The Legislature has 37 members in the Senate, and 125 members in the House. There are 22 Representatives in Congress. The State government in 1921 was Republican.

History.—The site of the present State of Ohio was first explored by La Salle in 1680. About 1750 the English laid claim to the region, and their effort to make good their claim brought on the French and Indian War. In 1763, the whole region was ceded by France to England, and after the Revolutionary War it be-

came part of the territory of the United States. The Ohio Company, organized in New England in 1787, composed of men who had served in the Revolutionary War, purchased from the government a large tract N. of the Ohio, paying for it in Continental currency. The first permanent settlement was made at Marietta in 1788. Cincinnati was founded soon after, and the settlement of the S. section of the territory progressed rapidly. In 1791 the Indian became stirred up by the encroachments of the whites, and a war ensued, which at first proved disastrous to the United States troops, but was finally ended in victory by General Wayne, in 1794. In the treaty of peace that followed, the Indians ceded a large section of territory, in which several new towns were quickly established. Ohio formed part of the Northwest Territory till 1800, when it was organized as a separate Territory, Chillicothe being made the seat of government. In 1802 a constitution was adopted for the "Eastern Division of the Territory N. W. of the Ohio," under the name of Ohio, and it was formally admitted into the Union on Feb. 19, 1803. Steamboat navigation on the Ohio began in 1812; excavation of the State canals began in 1825, and was completed in 1844; and the first railroad, begun in 1837, was opened to traffic by 1842. Ohio took an active part in the Civil War, and since the war has given seven Presidents to the Union—Grant, Hayes, Garfield, Harrison, McKinley, Taft, and Harding, all born in this State.

OHIO, a river of the United States, caled by the French explorers, after its Indian name, *la Belle Rivière* (The Beautiful River), next to the Missouri the largest affluent of the Mississippi. It is formed by the union of the Allegheny and Monongahela at Pittsburgh, Pa., and flows W. S. W. 950 miles, with a breadth of 400 to 1,400 yards, draining, with its tributaries, an area of 214,000 square miles. In its course it separates the States of Ohio, Indiana, and Illinois from the States of West Virginia and Kentucky. The principal towns on its banks are Pittsburgh, Wheeling, Cincinnati, Louisville (where there are rapids of 22 feet in a mile, with a steamboat canal), Evansville, New Albany, Madison, Portsmouth, Covington, and Cairo. The river's principal affluents are the Tennessee, Cumberland, Wabash, Kentucky, Great Kanawha, Green, Muskingum and Scioto. It is usually navigable from Pittsburgh.

OHIO, ARMY OF THE, a division of the Federal army in the Civil War; organized in 1861–1862 by General Buell; afterward came under the command of General Rosecrans and was called the Army of the Cumberland. A second department of the Ohio was formed, and was also in 1865 incorporated in the Army of the Cumberland.

OHIO NORTHERN UNIVERSITY, an institution under the auspices of the Methodist Episcopal Church situated at Ada, Ohio. Two normal schools consolidated in 1885 under the name of the Ohio Normal University. This institution was purchased by the Methodists in 1898, and re-chartered under the name of the Ohio Northern University. It is a coeducational institution, having a preparatory, normal, and college department. The college is in session all but four weeks in the year. In 1915 two new buildings were erected, bringing the total value of the grounds and buildings close to a million dollars. In 1919 there were 480 students and 28 instructors. President, A. E. Smith.

OHIO, UNIVERSITY OF, a coeducational non-sectarian institution in Athens, O.; founded in 1804; reported at the close of 1900: Professors and instructors, 96; students, 3,957; president, Alston Ellis, Ph.D.

OHIO WESLEYAN UNIVERSITY, a coeducational institution in Delaware, O.; founded in 1844 under the auspices of the Methodist Episcopal Church; reported at the close of 1919: Professors and instructors, 78; number of students, 1,250; president, J. W. Hoffman, D.D. The university includes a college of liberal arts, a school of music, oratory, business, medicine, etc.

OHM, or **OHMAD**, in electromagnetics, the unit of resistance. It is 10^9 C. G. S. units of resistance, and is the same as the value of one earth-quadrant per second.

OHM'S LAW, in electricity, a law enunciated by Professor Ohm, in 1827, for determining the quantity of electromotive force in a voltaic battery. It is that the intensity of the current in a voltaic current is equal to the electromotive force divided by the resistance.

OHNET, GEORGES, a French novelist; born in Paris, France, April 3, 1848; studied law, and after practicing some time as an advocate took to journalism, and later to literature proper. Under the general title of "The Battle of Life" he published a series of novels dealing wih social questions, which enjoyed great popularity. The first of this cycle of romances was "Serge Panine" (1881), quickly followed by "The Ironmaster"

(1882), "Countess Sarah" (1883), "Lise Fleuron" (1884), "The Great Maalpit" (1885), "Will" (1888), "In Deep Abyss." Died 1918.

OIL CAKE, the marc or refuse after oil is pressed from flax, rape, mustard, cotton, or hemp seed; or from cocoanut pulp. Used for cattle feed or manure.

OIL CITY, a city in Venango co., Pa.; at the junction of Oil creek and the Allegheny river and on the Erie, the Lake Shore and Michigan Southern, and Pennsylvania railroads; about 70 miles N. of Pittsburgh. It received its name from the extensive petroleum oil wells and oil industries located here. The city has a public hospital, public library, electric street railroads, electric lights, high school, daily and weekly newspapers, and National, State, and private banks. Besides large oil refineries, it has pipe works, iron foundries, engine and boiler works, wagon works, etc. Pop. (1910) 15,657; (1920) 21,274.

OILCLOTH, a tarpaulin; painted canvas for floor covering. Figures or patterns in oil colors are printed on one side by means of wooden blocks. A separate block is used for each color.

OIL GAS, in chemistry, a gas of high illuminating power, obtained by dropping oil on substances heated to redness and collecting the gaseous product.

OIL OF VITRIOL, the common name of strong sulphuric acid.

OIL PIPE LINES, a system of connected pipes used for the purpose of transporting oil—usually petroleum—from the fields to the refinery or selling point.

The first successful pipe line was laid in 1865 by Samuel von Syckle, of Titusville, Pennsylvania, who placed in successful operation a line four miles in length. Although General S. D. Karns suggested a gravity line from Burning Springs to the Ohio River at Parkersburg, West Virginia, in 1860, it was never constructed, and in 1862 a line of about three miles was laid by J. S. Hutchinson, but was unsuccessful because of the excessive leakage.

The success of this early line soon led to the construction of many others, in the face of much opposition, and actual interference, on the part of those people who made their livelihood by the transportation of oil in wagons.

The tendency to locate the refineries at the seaboard soon developed, and these refineries were soon connected with their oil fields by pipe lines. A pipe line from Olean, New York to Bayonne, New Jersey, was constructed in 1897. Standard Oil subsidiaries soon built a net work of lines reaching from the wells to the coast or to Great Lake cities.

It is estimated that there are now about one hundred thousand miles of pipe lines and feeders in the United States, as the western fields also have extensive pipe line systems. Pipe lines have also been constructed in Russia and Mexico, in Burma, Roumania, and in the Dutch East Indies.

The oil is kept in motion either by gravity or, as is more frequently the case, by high pressure compound pumps. In some parts of the country where the viscosity of the oil is very high, refilling is used to facilitate the forcing of the oil through the pipe.

OINTMENT, a soft, unctuous substance used for smearing or anointing; an unguent.

OISE, a department of France; separated from the English Channel by Seine-Inférieure; area, 2,272 square miles; pop. about 435,000. The principal rivers are the Oise, a tributary of the Seine, 150 miles in length, with the Aisne and Therain, affluents of the Oise. The soil is in general fertile, and agriculture advanced. The products are the usual grain crops, with an immense quantity of vegetables, which are sent to the markets of the metropolis. Before the World War there were extensive iron manufactures; porcelain, paper, chemicals, beet-root sugar, woolens, cottons, and lace (at Chantilly) were also made. Capital, Beauvais. During the World War (1914-1918) the Department was devastated by the German armies and repeatedly fought over by the opposing forces.

OKA, an important navigable river of central Russia, the principle affluent of the Volga from the S., rises in the government of Orel, and flows in a generally N. E. direction, and joins the Volga at Nijni-Novgorod, after a course of 706 miles. Its basin comprises the richest and most fertile region of Russia. The principal towns on its banks are Orel, Bielev, Kaluga, Riazan, and Muron; the most important affluents are the rivers Moscow, Kliasma, and Tzna. During spring the Oka is navigable from Orel to the Volga; but in summer the navigation is obstructed by sandbanks.

OKEECHOBEE LAKE, a large shallow lake in Southern Florida; about 40 miles in length by 25 in breadth, and with a maximum depth of 12 feet. Its waters are discharged through the Everglades, but there is no appreciable outlet

OKLAHOMA

SCALE OF STATUTE MILES
0 5 10 20 30 40 50 60

SCALE OF KILOMETERS
0 10 20 40 60 80 100

County Towns ⊙ Railroads

NORTHWEST PORTION OF OKLAHOMA

SCALE OF MILES 0 5 10 20 30

Longitude West from Greenwich

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stream. It contains a few low islands, and a drainage company has been reclaiming land since 1881.

OKHOTSK, SEA OF, an extensive inlet of the North Pacific Ocean, on the E. coast of Russian Siberia, nearly enclosed by Kamchatka and the Kuriles and Saghalien. It is little navigated. On its N. shore, at the mouth of the Okhota, is the small seaport of Okhotsk.

OKLAHOMA, a State in the South Central Division of the North American Union; bounded by Kansas, Missouri, Arkansas, Texas, New Mexico, and Colorado; admitted to statehood Nov. 16, 1907; capital, Oklahoma City; counties, 76; area, 70,057 square miles; pop. (1890) 258,657; (1900) 790,391; (1910) 1,657,155; (1920) 2,028,283.

Topography.—Oklahoma is in general an upland prairie rising gradually toward the N. and W. The principal elevations are the Wichita Mountains in the S. The principal rivers are the Arkansas, fed by the Canadian, the Cimarron, which waters the N. and central portions of the State, while the Red River forms a part of the S. boundary, and with its two forks, drains the S. W. portion of the State.

Banking.—On Sept. 1, 1919, there were reported 346 National banks in operation, having $19,273,000 in capital, $10,474,000 in outstanding circulation, and $42,271,000 in United States bonds. There were also 582 State banks, with $12,048,000 capital and $2,330,000 surplus.

Agriculture.—The acreage, production and value of the leading crops of 1919 was as follows: corn, 3,100,000 acres, production 74,400,000 bu., value $94,488,000; oats, 1,500,000 acres, production 49,500,000 bushels, value $34,650,000; wheat, 3,760,000 acres, production 52,642,000 bushels, value $107,912,000; hay, 700,000 acres, production, 1,540,000 tons, value $23,254,000; potatoes, 44,000 acres, production 3,525,000 bushels, value, $7,316,000; cotton, 2,341,000 acres, production 930,000 bales, value $163,680,000; sorghums, 1,440,000 acres, production 33,120,000 bushels, value $49,680,000.

Manufactures.—There were in 1914 2,518 manufacturing establishments in the State, employing 17,443 wage earners. The capital invested amounted to $65,478,000; the wages paid to $11,011,000; the value of the materials used to $70,970,000; and the value of the finished product to $102,006,000.

Mineral Production.—Oklahoma within recent years has become one of the most important of the mineral producing States, due chiefly to the great development of the petroleum fields which were discovered in 1904. The production increased from 1,400,000 barrels in 1904, to 97,915,243 barrels in 1915, 107,507,471 barrels in 1917, and 103,347,070 in 1918. The value of the production in the latter year was $231,136,205. Coal is also produced in important quantities. In 1919 the production was 3,200,000 tons. Oklahoma ranks second among the States in the production of natural gas. In 1918 there were 124,317,179 million cubic feet, valued at $15,805,135. Other important minerals produced are lead and zinc.

Education.—The State school system embraces elementary and public high schools, normal schools and colleges for higher education. Separate schools are provided for negroes and whites. In 1919 there were about 520,000 white pupils and about 45,000 negro pupils in the public schools. There were over 600 public high schools, with an attendance of over 35,000. In the 7 normal schools there were nearly 5,000 students. The total expenditure for education in 1919 was about $14,000,000. The institutions for higher education include the University of Oklahoma at Norman, the Agricultural and Mechanical College at Stillwater, and the Agricultural and Normal University for Colored Students at Langston.

Railways.—The railway mileage in 1919 was 6,532. Of this about 100 miles were laid during the year. The principal lines were the Atchison, Topeka and Santa Fé, the Chicago, Rock Island and Pacific, the Choctaw, Oklahoma and Gulf, the St. Louis and San Francisco, the Missouri, Kansas and Texas, and the Santa Fe and Pacific.

Finances.—The receipts for the fiscal year 1918 were $8,209,656, and the disbursements were $6,845,898. There was a balance at the beginning of July 1, 1917, of $2,375,690, and at the beginning of July 1, 1918, the balance was $4,450,378. The State debt on July 1, 1918, was $6,296,000. The assessed valuation of real and personal property was $1,335,220,527.

Churches.—The strongest denominations in the State are the Regular Baptist; Christian; Roman Catholic; Protestant Episcopal; Methodist Episcopal, South; Salvation Army; Presbyterian; Congregational; and Methodist Episcopal.

State Government.—The governor is elected for a term of four years. Legislative sessions are held biennially and are limited to 60 days each. The Legislature has 44 members in the Senate, and

99 in the House. There are 8 Representatives in Congress.

History.—Oklahoma is a part of the Louisiana Purchase of 1803, and of the tract set apart for Indian tribes by Act of Congress, June 30, 1834. On April 22, 1889, a proclamation was issued by the President opening up 1,900,000 acres of land for settlement. There was a great rush of settlers and speculators, the city of Guthrie coming into existence in one day with a population of 10,000. Other lands have been opened from time to time. The first Territorial governor was appointed in 1890. In September, 1891, the Iowa, Sac, Fox, and Pottawatomie lands of 1,000,000 acres were opened; in April, 1892, the Cheyenne and Arapahoe lands of 3,000,000 acres; on Sept. 16, 1893, the Cherokee Strip of 6,000,000 acres; on May 23, 1895, a small section known as the Kickapoo lands; and on Aug. 6, 1901, the Kiowa, Comanche, Apache, and Wichita reservations, representing over 3,000,000 acres. In June, 1890, the country known as No Man's Land was attached to Oklahoma by Act of Congress, being created into Beaver county. In 1896 Greer county, in the extreme S. W. portion of the Territory, was given to Oklahoma by decision of the Supreme Court. In 1907, with INDIAN TERRITORY, it was admitted to statehood.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, an institution maintained by State and Federal appropriations to encourage the study of scientific agriculture and electrical and mechanical engineering. It is situated at Stillwater, Okla., and in 1914–1915 had an enrollment of over twenty-three hundred. In addition to the university where courses in home economics, science and literature are given in addition to those already mentioned there are also a summer school, a cotton school and a secondary school. The latter gives a three year course admitting to the university.

OKLAHOMA CITY, a city, the capital of the State and county-seat of Oklahoma co., Okla.; on the North Canadian river, and on the Santa Fé, the Chicago, Rock Island and Pacific, the Missouri, Kansas and Texas, and the St. Louis and San Francisco railroads; 31 miles S. of Guthrie. It is the entrepot of a rich agricultural country, and is the center of an important oil producing region. It has developed greatly as a manufacturing community in recent years. It has National banks, and several daily and weekly newspapers, and contains cotton gins, flour mills, packing houses, publishing houses, oil refineries and soap factories. Pop. (1890) 4,151; (1900) 10,037; (1910) 64,205; (1920) 91,295.

OKLAHOMA, UNIVERSITY OF, a co-educational, non-sectarian institution in Norman, Okla.; founded in 1892; reported at the close of 1919: Professors and instructors, 150; students, 3,683; president, S. D. Brooks, LL.D.

OKMULGEE, a city of Oklahoma, the county-seat of Okmulgee co. It is on the St. Louis and San Francisco railroad. It is the center of a rich coal, oil, and gas region, and its industries include the manufacture of window glass and bottles. It has a hospital, excellent public schools, and an old council house of the Creek Indians. Pop. (1910) 4,176; (1920) 17,430.

OKU, YASUKATA, COUNT, a Japanese soldier. He was born in 1846 in the province of Chikuzen, and during the rebellion of 1877 warmly espoused the imperial cause, winning distinction in several battles. In the Chinese war of 1894-1895 he commanded the Fifth Army Division, and afterward helped in reorganizing military affairs. During the Russo-Japanese war he distinguished himself as general in command of the Second Army at Kinchow, Telissu, Liao-Yang and Mukden. Three years after being made general he was in 1906 named chief of the general staff, an office which he held for six years, becoming field-marshal at the close.

OKUMA, COUNT, a Japanese statesman; born in Kinshiu province, Japan, in 1837; took part in the Japanese revolution of 1868, and through it rose to office. In 1873 he was appointed Minister of Finance, and held that post till 1881, when through a disagreement with the premier, Marquis Ito, he resigned. In 1888 he became Minister for Foreign Affairs, but efforts to push the revision of the treaties with foreign nations made him unpopular, and he had to resign. In 1881 he organized the Progressive party known as the Kaishinto, and their power has steadily grown till, in 1896, it carried him into office as Foreign Minister. He always advocated party government for Japan, and in 1898, after the fall of Marquis Ito's ministry, organized the first government ever appointed in Japan on a party basis, but did not remain long in office. In 1907 he resigned the leadership in the Progressive party. Called to form a cabinet in 1914, his supporters won in the Lower House in the election of 1915. As premier he gained world-wide prominence for declaring war on Germany, the capture of Tsingtao in

1914 and the 21 demands on China in 1915. Most of the demands giving Japan increased privileges were obtained and in compensation the return of Tsingtao to China was promised. Count Okuma was founder and president of the Waseda University and also founded the Japanese Women's University.

OLAF I., King of Denmark, perished in 814, in combat with the Turks.

OLAF II., succeeded his brother, Canute IV., in 1086, and died in 1095.

OLAF, or ST. OLAF, one of the most celebrated of the Norwegian kings, son of Harald, chief of the district of Gränland; born about 995. He was a friend of the Normans, and fought as an ally of Ethelred's in England. He afterward established himself on the throne of Norway, and was a zealous supporter of Christianity. Canute the Great having landed in Norway with an army, Olaf fled to Russia, and in attempting to recover his dominions he was defeated and slain at the battle of Siklestad (1030). Since 1164 he has been honored as the patron saint of Norway. The order of St. Olaf, a Norwegian order given in reward for services rendered to king and country or to art and science, was founded in 1847.

ÖLAND. See OELAND.

O'LAUGHLIN, JOHN CALLAN, an American newspaper writer, born in Washington in 1873. He was educated in the common schools and studied European diplomacy in Columbia University. He served as correspondent in various parts of the world for many newspapers and contributed much to current magazines. He served as first assistant secretary of state for three months in 1909, and was secretary of Theodore Roosevelt during the latter's trips in Africa and Europe. He wrote "With Roosevelt from the Jungle Through Europe" (1910); "Imperilled America" (1916). He was commissioned major in the National Guard in 1918 and served as aide to Major-General Goethals.

OLD AGE PENSIONS, income received by superannuated employees of a state, municipality or private corporation. It is a prominent feature of the general tendency toward the assumption of responsibility on the part of society for the welfare of its individual units, brought about by the evils of modern industrialism. Originally based on the principle of individualism, the modern state is more and more becoming recognized as a social organization, as well as the source of administrative authority.

The first statesman to recognize the responsibility of the state for the welfare of aged workers was Bismarck, who initiated a system of compulsory state insurance, suggested by Schaeffle. Bismarck realized the powerful impression which was then being made on the masses by the Socialistic doctrines of Lasalle, and introduced this and other elements of paternalism into the government as a check to the growing Socialist movement.

Old age pensions, based on compulsory insurance, in which the workers themselves are compelled to pay a part of the cost of maintaining the system, the rest being borne by the state and the employers, have since been adopted in many other European countries, notably among the coal miners of Austria (in 1889), France (in 1894), Rumania (in 1895), and more generally in Sweden and Belgium. In the latter country old age pensions are a part of the system of mutual benefits instituted by the co-operative societies, notably in Ghent, where the profits from the co-operative enterprises are partly devoted to the old age pensions fund.

Old age pensions in the United States have been largely limited to the large corporations, especially in the more hazardous industries, such as in the railroads and coal mines and the steel foundries. In many instances this is done through voluntary associations, toward whose funds the corporations contribute the greater portion.

OLD BAILEY, until 1903 an English court or sessions house in London, in which the sittings of the Central Criminal Court were held for the trial of offenses within its jurisdiction. The judges of this court are the lord mayor, the lord chancellor, the judges, aldermen, recorder, and common serjeant of London. But of these the recorder, the serjeant, and the judge of the sheriff's court are in most cases the actually presiding judges. Here were tried in 1660, after the Restoration, the surviving judges of Charles I.; and Milton's "Iconoclasts" and "First Defense" were in the same year burned at the Old Bailey by the common hangman. The patriot Lord William Russell was tried here in 1683, Jack Sheppard in 1724, Jonathan Wild in 1725, the poet Savage in 1727, Dr. Dodd in 1777, Bellingham, the assassin of the statesman Perceval, in 1812, the Cato street conspirators in 1820. The Old Bailey adjoins Newgate Prison, between Holborn Viaduct and Ludgate Hill, where the Central Criminal Court now stands.

OLDCASTLE, SIR JOHN, LORD COBHAM, as English reformer; born in the 14th century, in the reign of Edward III., and obtained his peerage by marrying the daughter of Lord Cobham. He excited the resentment of the clergy by his zealous adherence to the doctrines of Wyclif, whose works he collected, transcribed, and distributed among the people. Under Henry V. he was accused of heresy; but the king, with whom he was a favorite, delayed the prosecutions against him, and tried to convince him of his alleged errors, but in vain. He was then cited before the Archbishop of Canterbury (1413), condemned as a heretic, and committed to the Tower, whence he escaped into Wales. Four years afterward he was retaken and burned alive in St. Giles' Fields, in December, 1417. He wrote "Twelve Conclusions," addressed to the Parliament of England.

OLD CATHOLICS, the name assumed by a body of German priests and laymen who refused to accept the dogma of Papal Infallibility, and, in consequence of its definition, formed themselves into a separate body. It was essentially a university movement, for the German bishops who had left Rome to avoid voting—Hefele among the number—afterward submitted. Van Schulte, a professor at Prague, published a formal protest; then came the Nuremberg protest of "Catholic professors" (August, 1870). Father Hyacinthe's "Appeal to the Bishops" followed in "La Libertà" early in 1871, and (March 28) Dr. Döllinger set forth his reasons for withholding his assent. Döllinger and Friedrich were immediately excommunicated. In September following, a congress was held at Munich, when it was resolved to seek reunion with the Greeks. In 1872 a second congress was held at Cologne. On Aug. 11, 1873, Dr. Reinkens was consecrated at Rotterdam by Dr. Hey de Kamp, Jansenist Bishop of Deventer, and, in 1876, Dr. Reinkens consecrated Dr. Herzog. The first synod (1874) made confession and fasting voluntary; the second (1875) reduced the number of feasts, and admitted only such impediments to marriage as were recognized by the State; the third (1876) permitted priests to marry, but forbade them to officiate after marriage. This prohibition was annulled by the fifth synod (1878), and, in consequence, Friedrich, Reusch, and some others withdrew. Congregations of Old Catholics exist in Austria, Italy, Spain, Switzerland, France, and Mexico, but their numbers are small.

OLD DOMINION, Virginia. In colonial days acts of Parliament relating to the Virginian settlements (which at that time included all the British dominions in North America) always designated them as the "Colony and Dominion of Virginia." In the maps of the time this colony was described as "Old Virginia," in contradistinction to the New England settlements, which were called "New Virginia."

OLDENBURG, a republic since 1918, formerly a Grand Duchy of North Germany, between lat. 52° 30′ and 53° 43′ N., lon. 7° 35′ and 8° 50′ E., having N. the North Sea, E. the territory of Bremen, S. and W. Hanover; area, 2,417 square miles. The surface is level, and so low on the coast as to render necessary the formation of dykes, as in Holland, to prevent inundations of the sea. The soil is rich on the banks of the rivers, but in other parts sandy or marshy. The principal rivers are the Weser, Hunte, Haase, Leda, and Jahde. Of the lakes, Drummersee is the principal. The productions include flax, hemp, hops, rape seed, corn and potatoes. Horses and cattle of superior breed, and sheep, are extensively reared. Its commerce is principally carried on in small vessels of from 20 to 40 tons, along the coast with Denmark, Holland, Hanover, etc. The duchy of Oldenburg was formed in 1773 by Joseph II., of the counties of Oldenburg and Delmenhorst. It joined the Confederation of the Rhine in 1808, incorporated with the French empire by Napoleon I. in 1810, and was restored to the duke in 1814. Augustus first assumed the title of grand duke in 1829. Kniphausen was added to the grand-duchy in 1854. Oldenburg entered into an alliance with Hanover against Prussia in 1865, and after the defeat of the Austrians, submitted to Prussia, with which it signed a treaty of alliance in 1866. Capital, Oldenburg. Pop. about 500,000.

OLD FORGE, a borough of Pennsylvania, in Lackawanna co. It is on the Lackawanna river and on the Delaware, Lackawanna, and Western railroad. It is the center of an important anthracite region and its principal industries are the mining and shipping of coal. There are also silk mills. It has an excellent high school, and other public buildings. Pop. (1910) 11,324; (1920) 12,237.

OLDHAM, a town of England, in Lancashire, 6 miles N. E. of Manchester. The spinning and weaving of cotton are the staple industries of the town, and employ within it and in its vicinity about 250 mills; and there are several large machine shops, foundries, tanner-

ies, roperies, silk factories, bleach works, etc. Pop. (1917) 133,721.

OLDHAM, JOHN, an English author; born in Shipton, in August, 1653; was educated at the school of Tetbury, and then at Oxford. He had many patrons, the last being the Earl of Kingston, in whose house he died. His works have been published in three volumes. He died in 1683.

OLD RED SANDSTONE. The old red sandstone, or Devonian system, may be considered as embracing the whole series of strata which lies between the Silurian and Carboniferous systems. Certain portions of the formation were first distinguished in Devonshire, from which it derives its second name. The lower margin of the system is characterized by strata containing the fossil remains of fishes, and forming a line of separation between it and the Silurian system. On its upper margin it is distinguished by the rarity of the vegetation which so remarkably distinguishes the over-lying carboniferous rocks. The Devonian formation is nowhere found so largely developed as in the United States. In the New York system of rocks it includes the following rocks:

Names.	Approximate thickness in New York.
Catskill group, or old red sandstone	2,000 feet.
Chemung	1,500 "
Portage, and Genesee	1,000 "
Hamilton	1,000 "
Marcellas	50 "
Upper Helderberg	50 "
Schoharie, and Cauda-galli	10 "
Oriskany sandstone	5 to 30 feet.

OLD TOWN, a town in Penobscot co., Me., near the W. bank of the Penobscot river, and on the Maine Central and Bangor and Aroostook railroads; 12 miles N. N. E. of Bangor. It has extensive water power, and is a center of the lumber industry, having one of the largest lumber mills in the world. Pop. (1920) 6,956.

OLD WORLD, the Eastern Hemisphere, so named in popular parlance subsequent to the discovery of the New World, in 1492.

OLEAN, a city in Cattaraugus co., N. Y., on the Alleghany river and on the Pennsylvania, the Erie, and the Pittsburgh, Shawmut and Northern railroads; 70 miles E. of Buffalo. It contains a large supply of natural gas, both for fuel and lighting; the Forman Public Library, several educational institutions, electric street railroads, electric lights, National banks, and daily and weekly newspapers. It has extensive petroleum, lumber, and tanning interests. Pop. (1910) 14,743; (1920) 20,506.

OLEANDER, in botany, *Nerium oleander*, the common, and *N. odorosum*, the sweet-scented oleander. They have lanceola coriaceous leaves, with parallel veins and fine roseate flowers. The former is a native of India, now naturalized in many warm countries. A decoction of its leaves forms a wash used in the S. of Europe to destroy cutaneous vermin; the powdered wood and bark are used at Nice

OLEANDER

as the basis of a rat poison. Sweet scented oleander is wild in Central India, Scinde, Afghanistan, and the outer Himalayas to 5,500 ft. Often cultivated in India, etc. All parts of the plant, especially the root, are poisonous.

OLENEK, a river of Northern Siberia which rises under the polar circle, and enters the Arctic Ocean to the W. of the Lena delta; length, about 1,200 miles.

OLEOGRAPH, a name given to an ordinary chromo lithograph which has been "roughed" after printing, mounted on canvas, and varnished so as to imitate an oil painting.

OLEOMARGARINE, in chemistry the more oily part of beef fat, prepared extensively in this country by allowing the melted fat to cool slowly to 30°, when most of the stearin crystallizes out and is removed by pressure. Another brand of oleomargarine is prepared by adding nut oil to suet fat in such proportion as to reduce the melting point to that of butter fat. Both kinds are largely used in making up artificial butter and cheese.

OLÉRON, an island lying from 2 to 10 miles off the W. coast of France, and forming part of the department of Charente-Inférieure. It is 19 miles long by

about 5 broad, and is unusually fertile. On Oléron are the port of Le Château, and the small towns of St. Pierre d'Oléron and St. Georges d'Oléron.

OLFACTORY NERVES, in anatomy, the fifth pair of cerebral nerves ramifying on the Schneiderian membrane, producing the sense of smell, and also sensibility to the nose.

OLIFANT RIVER, a forked stream of Cape Colony, South Africa; rises in the mountains N. E. of Cape Town, and, after a N. W. course of 150 miles, enters the Atlantic. Area of drainage basin, 13,000 square miles. Another stream bearing the same name rises in the Transvaal, and goes E. to join the Limpopo.

OLIGARCHY, a form of government in which the supreme power is vested in the hands of a small exclusive class; the members of such a class or body.

OLIGOCENE, in geology, a term employed by Beyrich to designate certain Tertiary beds of Germany (Mayence etc.).

OLIPHANT, LAURENCE, an English writer; born in Cape Town, South Africa, in 1829. Of good family and position, he roamed over the earth, deeply interested in the mystic philosophy of the East. He published a dozen books, including three novels; several works of a politico-military nature, such as "A Narrative of the Earl of Elgin's Mission to China and Japan" (1860); and various journalistic and philosophic books, like "Episodes in a Life of Adventure" (1887) and "Scientific Religion" (1888). He died in Twickenham, England, Dec. 23, 1888.

OLIPHANT, MARGARET (WILSON), a Scotch novelist; born in Walyford, Scotland, in April, 1828; lived in Liverpool, London, Rome, and for nearly 30 years in Windsor, England. She was a most prolific authoress, publishing over 110 books, besides numerous articles and essays. She excelled in delineating character, and had a keen sense of humor. Among her most important works are "Caleb Field" (1851); "Harry Muir" (1853); "The Quiet Heart" (1856); "Adam Graeme of Mossgray" (1857); "The Makers of Florence" (1874); "A Beleaguered City" (1880); "The Victorian Age of English Literature" (1892); "A Little Pilgrim in the Unseen" (1882); etc. She died in Wimbledon, England, June 25, 1897.

OLIVA, in zoölogy, olive; a genus of *Buccinidæ*. Shell cylindrical, polished; spire very short, suture channeled; aperture long, narrow, notched in front; columella callous, striated obliquely; bodywhorl furrowed near base. No operculum in the typical species, *O. porphyria*. Large foot and mantle lobes; eyes near tips of tentacles. Known species 120, from subtropical coasts of America, West Africa, India, China, and the Pacific. In palæontology, 20 fossil species, commencing in the Eocene Tertiary.

OLIVA, a village in Prussia, in the province of East Prussia, not far from Danzig. In a Cistercian abbey in this village a peace was concluded, May 3, 1660, which terminated the war between Sweden, Poland, the emperor, and Brandenburg.

OLIVÁREZ, GÁSPARO DE GUZMAN, COUNT OF, DUKE OF SAN LUCAR, an Italian statesman; born in Rome, Italy, where his father was ambassador, Jan. 6, 1587. He became the

COUNT OF OLIVÁREZ

friend of Philip IV., his confidant in his amours, and afterward his prime minister, in which capacity he exercised almost unlimited power for 22 years. Olivárez showed ability for government; but his constant endeavor was to wring money from the country that he might carry on wars against Portugal, France, and the Netherlands, provoked insurrections in Catalonia and Andalusia, and roused the Portuguese to shake off the Spanish yoke in 1640. The king was obliged to dismiss his favorite in 1643. He was ordered to retire to Toro (Zamora), and died there July 22, 1645.

OLIVE, in botany, *Olea europœa*, the leaves are oblong or lanceolate, smooth

above but horny beneath; the small white flowers in axillary, erect recemes; the ellipsoidal fruits bluish-black, berry-like, and pendulous. It is rarely above 25 feet high but is of slow growth, and reaches a great age. Two varieties are known, the Oleaster, not to be confounded with any of the modern order *Thymalaceæ*, and the cultivated variety. The former is spiny, and has worthless fruit; the many sub-varieties of the latter are unarmed and have large, oily fruits. The specific name *europœa* implies that Europe was its native continent, which is doubtful. Its original seat was prob-

OLIVE

ably Western Asia, and perhaps Europe as well. It was very abundant in Palestine, and even yet there are fine olive plantations near Jerusalem, Nabulus (formerly Schechem), etc. The Mount of Olives was named from it, and Gethsemane means an oil press. The tree has been introduced into and is cultivated in the countries bordering on the Mediterranean, and in some mountainous parts of India and Australia. Enormous quantities of olives are produced in Southern California. The unripe fruits are pickled, and the ripe olives used for the manufacture of olive oil. In chemistry, when ripe, olives weigh about 30 grains each, and contain 25 per cent. of water, and 69 per cent. of fat.

OLIVE OIL, in chemistry, Florence oil, or salad oil, a non-drying oil, extracted from the fruit of the olive by pressure. It has a pale yellow color with a tinge of green, a mild and agreeable taste. It is frequently adulterated with almond, nut, colza, cotton seed, and other oils. In pharmacy, it is used as a laxative; as an emollient ingredient in enemas; to envelop the poisonous particles in the stomach in cases of poisoning; to relieve pruritus in skin diseases; and to protect the surface from the air in scalds and burns.

OLIVER, GEORGE TENER, United States Senator from Pennsylvania; born in Ireland, 1848, of American parents meeting there; admitted to Pennsylvania bar in 1871, and practiced in Pittsburgh for ten years. Became interested in steel manufacturing and purchased "Pittsburgh Gazette" and "Pittsburgh Chronicle-Telegraph." He was elected to the United States Senate in 1909 to fill an unexpired term. In 1911 he was re-elected for a term ending 1917. In 1904 and 1916 he was a delegate to the National Convention of the Republican party. He died in 1919.

OLIVES, MOUNT OF, or MOUNT OLIVET, a ridge running N. and S. on the E. side of Jerusalem, its summit about half a mile from the city wall, and separated from it by the valley of the Kidron. It is composed of a chalky limestone, the rocks everywhere showing themselves. The olive trees that formerly covered it, are now represented by a few trees. There are three prominent summits on the ridge; of these the southernmost, which is lower than the other two, is now known as the "Mount of Offense," originally the "Mount of Corruption," because Solomon defiled it by idolatrous worship. Over this ridge passes the road to Bethany, the most frequented road to Jericho and the Jordan. The central summit rises 200 feet above Jerusalem, and presents a fine view of the city, and indeed of the whole region. Perhaps no spot on earth unites so fine a view, with so many memorials of the most solemn and important events. Over this hill Christ often climbed in his journeys to and from the holy city. Gethsemane lay at its foot on the W., and Bethany on its E. slope.

OLLA PODRIDA, a dish much in favor among all classes in Spain. It is composed of a mixture of all kinds of meat, cut up fine, and stewed with various kinds of vegetables; also an incongruous mixture; a miscellaneous collection of any kind; a medley.

OLLENDORF'S SYSTEM, a method of learning languages, invented by H. G. Ollendorf (1803–1865), and designed for those who teach themselves.

OLLIVANT, ALFRED, an English novelist; born in 1874. The son of a colonel in the British army; he was, after graduating from Rugby, sent to the Royal Military Academy at Woolwich, from which he graduated as senior gunner. For two years, until 1895, he held a commission in the Royal Artillery, then resigned, to take up a literary career. Among his works are "Owd Bob"

(1898); "Danny" (1903); "The Gentleman" (1908); "The Brown Mare" (1916); and "Two Men" (1919).

OLLIVIER, OLIVIER ÉMILE, a French statesman; born in Marseilles, France, July 2, 1825, and, having studied law at Paris, began to practice as an advocate in that city. By clever pleading he established a reputation at the bar, and after 1864 acquired influence as a member of the Legislative Assembly. In 1865 the Viceroy of Egypt appointed him to a high juridical office in that country. But he still took an active interest in French politics, and in January, 1870, Napoleon III. charged him to form a constitutional ministry. Ollivier was an unsuspecting tool in the hands of the Imperialists. "With a light heart" he rushed his country into the war with Germany, himself to be overthrown, after the first battle, on August 9. He withdrew to Italy. Ollivier wrote books on "Lamartine" (1874), and "Thiers" (1879), and "The Church and the State to the Council of the Vatican" (1879); "Principles and Conduct" (1875); "The Liberal Regime," "Michel Ango" (1892); "L'Empire Liberal," 6 vols. (1894–1908). He died in 1913.

OLMSTED, CHARLES SANFORD, an American Protestant Episcopal bishop; born at Olmstedville, N. Y., in 1853. He graduated from General Theological Seminary in 1876. He was ordained priest in 1877. He served as rector at various cities in New York and Pennsylvania until 1902, when he was consecrated bishop of Colorado. He wrote "December Musings" (poems), (1898); "Discipline of Perfection" (1902); "Essays on Mediæval Poets" (1904). Died in 1918.

OLMSTED, CHARLES TYLER, an American Protestant Episcopal bishop; born in Cohoes, N. Y., 1842. He graduated from Trinity College in 1865, and, after studying divinity at St. Stephen's College, he became professor of mathematics in that institution in 1866. He was ordained priest in 1868, and served as rector and vicar of several important churches of New York City and Utica, and was consecrated bishop coadjutor of Central N. Y. in 1902, and was appointed bishop of Central N. Y. in 1904.

OLMSTED, FREDERICK LAW, American landscape architect; born in Staten Island, N. Y., 1870; graduated from Harvard, studied landscape architecture under his father and began practice in 1895. He has designed many public parks and other city improvements; was a member of the Commission on Improvements of Washington, in 1902; was landscape architect of the Metropolitan Park system of Boston in 1898, and designed plans for Forest Hills, L. I., for the Sage Foundation Homes Co. He became professor of landscape architecture in Harvard in 1903, and member of the National Commission of Fine Arts in 1910.

OLMSTED, VICTOR HUGO, an American statistician; born at Marion, O., in 1853. After studying at George Washington University he was admitted to the bar in 1884. He served as chief of the division of results in the 10th Census, and from 1883 to 1889 was employed in the General Land Office. From 1889 to 1901 was statistical expert of the United States Department of Labor. He investigated labor conditions in Hawaii in 1900. From 1902 he served in various capacities in the United States Department of Agriculture and in connection with the Census Bureau. From 1906 to 1914 he was chief of the Bureau of Statistics, and from 1913 he was field agent of the Bureau of Crop Estimates of the Department of Agriculture.

OLMÜTZ, second city of Moravia, since October, 1918, in Czecho-Slovakia, on the March, 129 miles N. N. E. of Vienna. Notable are the 14th century cathedral (restored 1887); the church of St. Maurice (1472), whose organ has 48 stops and 2,342 pipes; the noble town hall, with a steeple 255 feet high; the archiepiscopal palace; and the lofty Trinity column on the Oberring. The former university (1851–1855) is reduced to a theological faculty, with over 200 students and a library of 75,000 volumes. The trade is more important than the manufactures. Olmütz, which in 1640 was superseded by Brünn as the capital of Moravia, suffered severely in both the Thirty and the Seven Years' Wars. In 1848 Ferdinand I. signed his abdication here.

OLMÜTZ, CONFERENCE OF, a conference held at Olmütz, a city of Moravia, Austria, Feb. 28–29, 1850, between Russia and Austria respecting the affairs of Germany and especially in reference to the revolts in Hesse and Schleswig-Holstein against their rulers, the Elector of Hesse and the King of Denmark. By the mediation of Russia, Schleswig-Holstein was given to Denmark, and the Elector Hesse was reinstated.

OLNEY, RICHARD, an American lawyer; born in Oxford, Mass., Sept. 15, 1835; was graduated at Brown Univer-

sity in 1856, and at Harvard Law School in 1858; practiced law in Boston; was United States attorney-general in 1893–1895; and Secretary of State of the United States in 1895–1897; then resumed private practice. In 1900 he supported Bryan, whom he had opposed, because of Republican attitude toward trusts and imperialism. In 1906 he led the policy holders in their attacks on the New York and Mutual Insurance Companies. In 1913 he declined the appointment of ambassador to Great Britain. He died in 1917.

OLONETZ, a government of Russia, bounded on the north by Archangel, on the E. by Vologda, on the S. by Novgorod, and on the W. by Finland. It has an area of about 50,000 square miles. It is traversed by many rivers and there are over 2,000 lakes within its boundaries. The chief industry is lumbering. The climate is ill adapted for agriculture. Pop, about 480,000. The capital is Petrozadosk.

OLTENITZA, a town in Rumania, at the junction of the Arjish with the Danube, 37 miles S. E. of Bucharest. A battle was fought here Nov. 4, 1853, and also July 29, 1854, in both of which the Russians were defeated by the Turks.

OLUSTEE, or **OLUSTEE STATION**, a village of Baker co., Fla., about 20 miles E. of Lake City. Here in February, 1864, a Union force numbering about 5,000 men, under General Seymour encountered a body of about 3,000 Confederates, under General Finnegan, and after a severe conflict of several hours, the Nationals were defeated, with a loss of over 2,000 men, besides artillery and wagon trains. Confederate loss about 1,000 men.

OLYMPIA, a celebrated valley of Elis, in Greece, on the right bank of the Alpheus, and the seat of the Olympic games. The Sacred Grove (called the Altis) of Olympia, enclosed a level space about 4,000 feet long, nearly 2,000 broad, containing both the spot appropriated to the games and the sanctuaries connected with them. It was finely wooded, and in its center stood a clump of sycamores. The Altis was crossed from W. to E. by a road called the "Pompic Way," along which all the processions passed. The most celebrated building was the Olympieium, or Olympium, dedicated to Olympian Zeus. It was designed by the architect Libon of Elis in the 6th century B. C., but was not completed for more than a century. It contained a colossal statue of the god, the masterpiece of the sculptor Phidias.

OLYMPIA, a city, capital of the State of Washington, and county-seat of Thurston co.; on the Deschutes river where it enters Budds Inlet, Puget Sound, and on the Northern Pacific Railroad. The city has steamboat connection with Victoria and other places on Puget Sound as well as the principal Pacific ports. Here are St. Martin's College (R. C.), Providence Academy, state capitol, the county court house, St. Peter's Hospital, street railroad and electric light plants, waterworks, National banks, and several daily and weekly newspapers. Olympia has a boot and shoe factory, an ice factory, iron works, wooden pipe works, and saw shingle, and flour mills. Pop. (1910) 6,996; (1920) 7,795.

OLYMPIAD, a period of four years, being the interval from one celebration of the Olympic games to another, by which the ancient Greeks reckoned their time. The first Olympiad corresponds with the 776th year before the birth of Christ. The last Olympiad was the 293rd, corresponding to the year A. D. 393.

OLYMPIC GAMES. These games, so famous among the Greeks, said to have been instituted in honor of Jupiter by the Idæi Dactyli, 1453 B. C., or by Pelops, 1307 B. C., revived by Iphitus 884 B. C., were held at the beginning of every fifth year, on the banks of the Alpheus, near Olympia, in the Peloponnesus, now the Morea, to exercise the youth in five kinds of combats, the conquerors being highly honored. The prize contended for was a crown made of a kind of wild olive, appropriated to this use. The festival was abolished by Theodosius, A. D. 394. In 1896, after a lapse of more than 1,500 years, these games were revived at Athens. They began April 6 and continued for five consecutive days. The number of spectators was enormous. Athletes from various countries of the world competed for prizes, and some of the principal contests were won by Americans. These games consisted of foot racing, wrestling, fencing, swimming, etc. The king crowned the victors with olive branches. In July, 1900, the second series was held in Paris, France, and was a great success. Americans again won a large portion of the events. At the meet at Stockholm, 1912, the score of American athletes was 85 per cent., leading all other nations. The World War prevented a meet in Berlin in 1916. Olympic games were held in Brussels in 1920.

OLYMPUS, a celebrated mountain of Thessaly, on the border of Macedonia, 30

miles N. of Larissa; lat. 40° 4′ 32″ N., lon. 22° 25′ E. Its highest peak is 9,745 feet above the sea, and is covered with snow during two-thirds of the year. The E. side, which fronts the sea, is composed of a line of precipices, while a profusion of oak, beech, chestnut, and other trees are scattered at its base, and higher up are immense forests of pine. It was regarded by the ancient Greeks as the abode of the gods; and the palace of Jupiter was supposed to be on the summit. Olympus is also the ancient name of several mountains, viz.: the N. W. range of Taurus, in Mysia; a mountain in the island of Cyprus; one in Lycia; one in Elis; and one on the borders of Laconia and Arcadia.

OLYPHANT, a borough of Pennsylvania, in Lackawanna co. It is near the Lackawanna river, and on the Delaware and Hudson, the Wilkes-Barre and Eastern, and the New York, Ontario, and Western railroads. It is the center of an important anthracite region of the State. Its chief industries are the mining and shipping of coal. There are also manufactures of blasting powder, iron and steel goods, cigars, silks, etc. Pop. (1910) 8,305; (1920) 10,236.

OMAGH, the county town of Tyrone, Ireland, on the Strule, 34 miles S. of Londonderry and 110 N. N. W. of Dublin. It grew up around an abbey founded in 792, but is first heard of as a fortress in the end of the 15th century, when it was forced to surrender to the English. It formed part of James I.'s "Plantation" grants, and was strongly garrisoned by Mountjoy. On its being evacuated by the troops of James II, in 1689 it was partially burned, and a second fire in 1743 completed its destruction. But it has been well rebuilt, and is now a neat and prosperous town. Pop. (1918) 4,836.

OMAHA, a city of Nebraska, the largest in the State, and the county-seat of Douglas co. It is on the Missouri river, about 500 miles W. of Chicago. Omaha is located on 9 trunk lines of railroads and 22 branches. These include the Burlington route, the Chicago, Milwaukee and St. Paul, the Chicago, Rock Island and Pacific, the Wabash, the Northwestern, the Illinois Central, the Union Pacific, and the Missouri Pacific. The city is also on the Missouri river, which is spanned by many great bridges connecting it with Council Bluffs, Iowa. A belt line of railroads encircles the city, giving railway inter-communication. The area of the city is 37.78 square miles. There are 800 miles of streets, and a water system costing $10,000,000. Omaha is the center of an important agricultural area and is the first city in the United States in the production of butter, the second corn and live stock market, the third agricultural implement center, and the fourth railroad center. The city is attractively situated on a plateau rising into bluffs which are used largely for residence sites. The business district lies adjacent to the river.

From its position with reference to the West, Omaha is called the Gate City. It has a park system of over 1,000 acres in extent, and includes municipal bathing beaches, swimming pools, playgrounds, golf courses, etc.

The large parks are connected by a boulevard system of over 35 miles in length.

There is a public school enrollment of about 35,000 and the cost of the school system is over $2,000,000 annually. The institutions for higher education include Creighton University, the University of Omaha, Omaha Medical College, Brownell Hall, and several private schools. There are in all over 80 public and private schools. The public library contains over 150,000 volumes. The notable buildings include the city hall, county court house, United States Government building, bank buildings, an auditorium, and the Protestant Episcopal and Roman Catholic cathedrals. The city contains the Nebraska Institution for the Deaf, and several large hospitals. It is the seat of the military headquarters of the Department of Missouri. Fort Omaha lies within the city limits and Fort Crook adjoins it on the south.

Omaha is an important wholesale center with an annual business of over $350,000,000. The leading lines are automobiles, groceries, oil, commission products, boilers and accessories, agricultural implements, drygoods, lumber, coal, plumbing and heating supplies. The total value of the manufactures is over $460,000,000 annually. Meat packing is the chief industry. The annual output is valued at over $300,000,000. Omaha is first in pig lead production. Other important manufactures are flour, butter, food products of all kinds, clothing, boots and shoes, rubber goods, steam engines, boilers, etc. The bank clearings exceed $3,000,000,000 annually. It has branches of the Federal Land Bank and of the Federal Reserve Bank.

Omaha is an Indian name of disputed meaning. The town was laid out in 1854 on a scale which anticipated its future growth. Its commercial importance was assured when it was selected as the east-

ern terminus of the Union Pacific railroad. Stock yards were established in 1884. In 1898 the trans-Mississippi Exposition was held here. The Grain Exchange was opened in 1904. In 1920 Omaha was selected as the half-way station of the Trans-continental Aerial Mail. Pop. (1910) 124,096; (1920) 191,601.

OMAHA, UNIVERSITY OF, a coeducational institution in Omaha, Neb.; founded in 1880 under the auspices of the Presbyterian Church; reported at the close of 1919: Professors and instructors, 73; students, 509. President, D. E. Jenkins, Ph. D.

OMAHAS, a tribe of North American Indians living in E. Nebraska. They number about 1,400. The name is derived from an Indian word meaning "those who go up the stream, or against the current."

OMAN, or **MUSKAT**, a sultanate in Arabia (British Protectorate), partly on the Persian Gulf, partly on the Indian Ocean; area, estimated at 82,000 square miles; pop. about 500,000. The chief features of the country are stretches of barren sand or rock, mountains reaching the height of 10,000 feet; fertile valleys and plains, yielding abundance of grain, sugar, fruits, cotton, coffee, etc., Oman being the richest part of the Arabian peninsula both in agricultural products and in mineral treasures. The inhabitants are very superstitious and immoral. They are mostly Arabs. The form of government is a monarchy (the ruler being styled Imam), limited by a powerful aristocracy with hereditary privileges. Zanzibar and its dependencies formerly belonged to Oman. The capital is Muskat. Pop. 24,000. Since 1913 the interior has been in a state of continuous revolt. The Sultan's power really only extends along the sea-coast.

OMAN, CHARLES WILLIAM CHADWICK, British historian, born in India, 1860; graduate of Oxford; became deputy professor of modern history there in 1900. In 1905 he was elected to the British Academy of Sciences. Among his best known works are: "A Short History of the Byzantine Empire" (1892); "A History of Europe, from 476 to 918" (1893); "A History of the Art of War in the Middle Ages" (1898); and a "History of England" (6 vols., 1905).

OMAN, GULF OF, an arm of the Arabian Sea, between Oman and the S. coast of Persia. It is connected with the Persian Gulf by the Strait of Ormuz.

OMAR I., Caliph of the Mussulmans, the successor of Abu-Bekr, and father-in-law of Mohammed. He began his reign A. D. 634, and is conspicuous among the conquerors who chiefly contributed to the spread of Ilsamism. His generals drove the Greeks out of Syria and Phœnicia; and the Caliph himself took possession of Jerusalem in 638, till it was reconquered by Godfrey of Bouillon, at the end of the 11th century. Amru, one of his generals, defeated the troops of Heraclius, near Antioch, in 641. Memphis and Alexandria surrendered; all Egypt and a part of Libya were conquered from the Romans; and the famous library, which had been founded at Alexandria by Ptolemy Philadelphus, is said to have been burnt by the express order of Omar I. Having fixed his residence at Medina, he was there assassinated by a Persian slave, in the 10th year of his reign, A. D. 643. He refused to appoint a successor; and thus the caliphate became elective. He introduced the system of standing armies, and a police force.

OMAR II., the eighth Caliph of the Ommiades, great-grandson of the preceding, and succeeded Solyman in 717. He laid siege to Constantinople, but was forced to raise it, on account of a violent storm, which destroyed a great part of his fleet. He was poisoned in 720.

OMAR KHAYYAM, a Persian poet, astronomer, and mathematician; born in Nishapur in Khorasan. His scientific works, which were of high value in their day, have been eclipsed by his "Rubaiyat," a collection of about 500 epigrams in praise of wine, love, and pleasure. A portion of the "Rubaiyat" was translated or rather adapted into English verse by Edward Fitzgerald (1859–1879), and enjoyed a wide popularity. Other versions were made but Fitzgerald's remains the best. Omar Khayyam died in Mishapur 1123.

OMBAY, MALOEWA, or **MALUWA**, Malay Archipelago, one of the Sunda Islands between Celebes and the N. W. coast of Australia, from which it is separated by the Strait of Ombay. The hills are volcanic, and the coasts steep and difficult to approach. The inhabitants are dark brown, have thick lips, flat nose, and woolly hair; appearing to be of mixed Negro and Malay origin. They are armed with the bow, spear, and creese, and live on the produce of the chase, with fish, cocoanuts, rice, and honey. A portion of the island formerly beyonged to the Portuguese, but since Aug. 6, 1851, it has entirely become a

Netherlands possession; included in the Residency of Timor. Pop. about 194,000.

OMEGA, the name for the Greek long o. It was the last letter in the Greek alphabet, as alpha was the first. Inscriptions on tombstones, public documents, etc., very often began with these two letters, meaning, "In the name of God."

OMEN, a sign believed to prognosticate a future event. Omens have been common among most nations, but were chiefly received in the ruder ages, and among the more ignorant of a people. Even in the present day, in many parts of England and the United States, a superstitious belief in omens exists. The howling of a dog by night is believed to presage a death in the neighborhood. The screeching of the owl and the croaking of the raven have, both in ancient and modern times, been regarded as omens of some dire calamity. To present a knife, scissors, razor, or other sharp or cutting instrument to one's friend is unlucky, as they are apt to divide love and friendship. The list could be multiplied indefinitely. Fishermen and sailors are particularly influenced by omens, which they fancy they discover in the most trivial circumstances. To lose a bucket, or to throw a cat overboard, is believed to be very unlucky. Whistling is supposed to raise the wind. By a regard to these things, many persons add very considerably to their proper share of human misery without any countervailing amount of good.

OMMIADES, a dynasty founded in Arabia by Moawiyah, in 655 or 661. Merwan II., the 14th and last caliph of this race, was slain in a mosque on the banks of the Nile, Feb. 10, 750, when the Abbassides assumed the reins of power. Abderrahman, the only member of the Ommiades who escaped the massacre at Damascus, founded a caliphate in Spain, in 755. Eighteen caliphs reigned, Hinem III., who resigned in 1031, being the last.

OMNIBUS, a Latin word signifying "for all," and now applied in several languages to the well-known vehicle used for the conveyance of passengers at a cheap rate. The first conveyances of the kind were those which came into use in Paris (March, 1662) in consequence of an edict of Louis XIV., but they soon fell into disuse, and were not again reintroduced till 1827. A Mr. Shillibur started the first omnibus in London in 1829, and they were introduced into New York in 1830, and Amsterdam in 1839.

OMPHALE, a queen of Lydia. She married Tmolus, who, at his death, left her mistress of his kingdom. She purchased Hercules, who had been sold as a slave for the recovery of his senses, after the murder of Eurytus. Omphale soon restored her slave to liberty, and the hero became enamored of his mistress. The queen favored his passion, and had a son by him.

OMRI, a general of the army of Elah, King of Israel, who, being at the siege of Gibbethon, and hearing that his master Elah was assassinated by Zimri, who had usurped his kingdom, raised the siege, and being elected king by his army, marched against Zimri, attacked him at Tirzah, and forced him to burn himself and all his family in the palace in which he had shut himself up. After his death, half of Israel acknowledged Omri for king; the other half adhered to Tibni, son of Ginath, which division continued four years. When Tibni was dead, the people united in acknowledging Omri as King of all Israel, and he reigned 12 years. Omri built the city of Samaria, which became the capital of the kingdom of the 12 tribes.

OMSK, chief town of the former Russian province of Akmolinsk, at the confluence of the Om with the Irtish, 1,800 miles E. of Moscow. It was built in 1716 as a defense against the Kirghiz; but is now of no importance as a fortress. It is the seat of administration for the Steppe provinces of Western Asia. The trade is in cattle, hides, furs, and tea. Pop. 135,800.

ONDERDONK, FRANK SCOVILL, American educator; born in Mission Valley, Texas, in 1871. After studying at Southwestern University, he entered the Methodist Episcopal Church as minister, in 1892, and served as missionary in Mexico. From 1907 to 1914 he was missionary at San Luis Potosi, Mexico, and from 1914 was superintendent of the Mexican, Italian and Bohemian missions to Texas.

O'NEAL, EMMET, an American public official; born in Florence, Ala., in 1853. Graduated University of Alabama in 1873, and was admitted to the bar in 1875. He was United States attorney for the N. district of Alabama from 1893 to 1897 and was elected governor of Alabama for the term 1911 to 1915. He was president of the Alabama State Bar Association from 1909 to 1910, and was a member of other important professional associations. He was chairman of the District Exemption Board of Division 1, during the operation of the draft. He wrote "The State Constitution."

ONEGA, a river in Russia, which, issuing from Lake Latcha, government of Olonetz, flows first N. E., then N. W., and after a course of about 270 miles, falls into the White Sea at the S. E. extremity of the Gulf of Onega.

ONEGA, LAKE, in the N. of Russia, after Ladoga, to the N. E. of which it lies, the largest lake in Europe; 50 miles in greatest breadth, 146 miles in length, and 1,000 feet in depth in parts; area 3,764 square miles. It is fed by numerous rivers; but its only outlet is the river Swir, which flows S. W. into Lake Ladoga. The N. end is studded with islands and deeply indented with bays. The shores in other parts are flat and low and regular. Though the water is ice bound generally for 156 days in the year, the lake is the scene of busy traffic in other seasons. Communication is promoted by a canal cut parallel to the S. shore. Fish abound. Mirages are frequent at times. Surveys were completed in 1890 for a canal 145 miles long to connect Lake Onega with the White Sea.

ONEIDA, a lake occupying portions of Oneida, Madison, Onondaga, and Oswego cos., N. Y. It covers an area of about 100 miles, abounds in fish of an excellent quality, receives many small streams, and empties its surplus waters into the Osage river by Oneida river.

ONEIDA, a town in Madison co., N. Y.; on Oneida creek, and on the New York, Ontario, and Western, the New York Central and Hudson River railroads; 26 miles E. of Syracuse. Here are a high school, waterworks, street railroad system, electric light plant, National and State banks, and several weekly newspapers. The town has a number of flouring mills, planing mill, steam knitting mill, foundry and manufactories of steam engines, and carriages. Pop. (1910) 8,317; (1920) 10,541.

ONEIDA COMMUNITY, a religious communistic society, otherwise known as PERFECTIONIST (*q. v.*).

ONEIDAS, once a North American Indian tribe inhabiting Central New York. A remnant in Wisconsin are well advanced in civilization.

O'NEIL, CHARLES, an American rear-admiral; born in Manchester, England, in 1842. He entered the American naval service as master's mate in 1861, and served in many American naval engagements during the Civil War. Commissioned lieutenant in 1868, and rose successively through the grades until he became rear-admiral, in 1901. From 1897 to 1904 he was Chief of the Naval Bureau of Ordnance. In the latter year he retired but was detailed for special ordnance duty abroad for one year, in 1904.

O'NEIL, JAMES, an American actor, born in Ireland in 1847. He made his first appearance on the American stage in Cincinnati in 1867, after which he appeared as leading man and as star in many theaters in the United States. For fifteen years he was star in "Monte Cristo," and afterwards played the star part in "The Three Musketeers" for many years. He died in 1920.

ONEONTA, a village in Otsego co., N. Y.; on the Susquehanna river, and on the Delaware and Hudson and other railroads; 60 miles N. E. of Binghamton. It contains a State Normal School, a State Armory, public library, National banks, and a number of daily and weekly newspapers. It has shirt factories, cigar, piano, sash and door factories, grain elevators, knitting mill, foundries, and the machine shops of the Delaware and Hudson Railroad, and an assessed valuation of over $2,000,000. Pop. (1910) 9,491; (1920) 11,582.

ONION, in botany, horticulture, etc., *allium cepa*, and the genus *Allium*. The onion has been cultivated from a very early age (Num. xi: 51). A variety of it is called the potato, or underground onion. It multiplies in bulbs below the ground.

ONIONS, OLIVER, an English novelist; born in 1876. Trained in the Royal School of Art and began his literary work in Paris, writing for a students' periodical. In addition to his writing, he has carried on his art work, doing mostly war pictures, posters and drawings for advertisements. His best-known novels are: "Little Devil Doubt" (1909); "In Accordance With the Evidence" (1912); "The Debit Account" (1913); "The Story of Louie" (1913); "Mushroom Town" (1915).

ONOMATOPŒIA, or **ONOMATOPEIA**, name-making; the formation of words in imitation of the sounds made by the things signified; as, buzz, hiss, peewit, etc.

ONONDAGA, LAKE, a small lake in Central New York, near Syracuse; outlet, Seneca river.

ONONDAGAS, a tribe of North American Indians living chiefly in New York. At one time they laid claim to all the country from Onondaga Lake to Lake Ontario on the N., and to the Susquehanna river on the S. At the close of

the Revolutionary War some settled on Grand river, Ontario, and the remainder in New York. The total number in Canada and New York State is at present about 900.

ONTARIO, a province of the Dominion of Canada (formerly called Upper Canada, or Canada West); bounded on the W. by Manitoba, on the N. by Keewatin and James Bay; on the N. E. and E. by the province of Quebec, on the S. E. by the St. Lawrence, on the S. and S. W. by Lakes Ontario, Erie, Huron and Superior; area, 222,000 square miles; pop. (1917) (est.) 2,750,000; capital, Toronto, pop. (1919) 499,278. Ottawa, the Dominion capital, is situated in the E. part of the province. Other important cities are Hamilton and London. The chief lakes of the province are Simcoe, Nipissing, and Nipigon. The chief rivers are on the boundary, the Ottawa, the Albany, and the Niagara, the Falls lying partly in the province. The surface is generally low, no elevation exceeding 1,000 feet. The province is crossed by the Laurentian hills. The climate is healthful with extreme cold only in the N. part. The richest, most thickly settled, and most highly cultivated portion of the province is the peninsula between the St. Lawrence and Lakes Ontario, Erie, and Huron. A large part of the province is covered with timber, and this, with the water facilities, makes lumbering one of the chief industries.

Minerals.—Mining is the principal industry of the province, the minerals including silver, copper, iron, nickel, gypsum, marble, and salt. The province is rich in petroleum. Lambton county containing the largest oil-producing districts. In 1883 nickel was discovered at Sudbury, the deposits since proving to be the richest on the Continent. The total value of the mineral production in 1918 was $80,208,972. Of this the gold was valued at $8,502,480; silver, $17,415,882; nickel in worth, $26,578,200; marble (metallic), $1,262,116; copper, $8,262,360; natural gas, $2,498,769; cement, $1,910,839; salt, $1,287,039.

Agriculture.—Farming is an important occupation and most of the soil is of excellent quality. The chief crops are hay and clover, Indian corn, wheat, barley, oats, peas, root crops, potatoes, and tobacco. The value of the crops in 1918 was $363,909,778. The value of farm buildings, land, livestock, etc., was $1,633,413,528. The butter production was valued at $13,126,470, and the cheese at $24,356,019. Stock raising, dairy farming, and bee culture are among the industries of the province. The value of live stock sold or slaughtered in 1899 was $38,457,018. The wool clip of the province in 1900 was 5,805,921 pounds.

Fisheries.—In 1918 the yield of the fisheries was valued at $3,175,104. The catch consists chiefly of trout, white fish, herring, and pickerel.

Government.—The provincial government is administered by a lieutenant-governor appointed by the governor-general for five years, assisted by a responsible ministry. There is only one chamber, the Legislative Assembly which has 111 members. The government's policy is to encourage the development of provincial resources.

Manufacturing.—Ontario is essentially a manufacturing province. Great industries are established and there is a succession of prosperous cities and towns from E to W. With the steady development of the water powers of the province, and the increased value of its resources, unlimited opportunities present themselves. In 1917 there were 14,581 establishments. Capital, $1,335,968,699. Employes, 289,503. Wages, $229,191,908. Value of products, $1,533,738,655.

Education.—The school system of the province is free, attendance being compulsory between the ages of 7 and 13; it includes kindergartens, public schools, and high schools (or collegiate institutions). "Separate schools" (chiefly Roman Catholic) are recognized as part of the system. The educational grant made by the Government in 1919 was $3,807,509. At the head of the educational system stands the Toronto University.

History.—Ontario was first settled by the French. At the close of the American Revolution, many loyalists came to this region from the United States. In 1760 it passed into the hands of the British, who organized the province of Quebec in 1774 and in 1791 divided it into Upper and Lower Canada. These were reunited in 1841, and again separated when the Dominon of Canada was organized in 1867, the W. province becoming the province of Ontario. Several battles of the War of 1812 occurred in this region, including those of the Thames, of Lundy's Lane, etc. An unsuccessful rebellion occurred in 1837.

ONTARIO, LAKE, the smallest and most E. of the five great lakes of North America, in the St. Lawrence basin, partly belonging to Canada and partly to the State of New York. It is an elongated, oval shape, 172 miles in length, by a maximum breadth (in the center) of 60 miles; covering an area of about 5,400 square miles. Its surface level is about 334 feet below that of Lake Erie,

ONTARIO

STATUTE MILES
0 10 20 30 40 50 60 70 80

KILOMETERS
0 10 20 30 40 50 60 70 80 90 100

WESTERN PART OF ONTARIO

STATUTE MILES
0 20 40 60 80 100 120 140

Longitude West from Greenwich

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and 231 feet above the tide level of the St. Lawrence. Its depth is said to average 490 feet; but in some places it is upwards of 600 feet in depth, and it is navigable throughout its whole extent for vessels of the largest size. The St. Lawrence (under the name of the Niagara river) enters it near its S. W. and leaves it at its N. E. extremity, where it is much encumbered with small islands. Lake Ontario has many good harbors; and as it never freezes, except at the sides, where the water is shallow, its navigation is not interrupted like that of Lake Erie. It is, however, subject to violent storms and heavy swells. Toronto, Kingston, Newcastle, and Niagara are the principal towns on the British side; and Oswego, Genesee, and Sackett's Harbor on the American bank. This lake receives numerous rivers, including the Trent and Humber on its N., and the Black, Genesee, and Oswego from its S. shores. It communicates by the Genesee river and Oswego canal with the Erie canal, and, consequently, with the Hudson river and New York City; the Niagara river and the Welland canal, at its S. W. extremity, unite it with Lake Erie, and the Rideau canal connects it with the Ottawa at Ottawa city. Numerous sailing vessels and steamers of large size navigate this lake, which is the center of an extensive commerce.

ONYX, a semi-pellucid gem with variously colored zones or veins. Any stone exhibiting layers of two or more colors strongly contrasted is called an onyx, as banded jasper, chalcedony, etc., but more particularly the latter when it is marked with white and stratified with opaque and translucent lines. The ancients valued it very highly, and used it much for cameos, many of the finest cameos in existence being of onyx.

ONYX MARBLE, a very beautiful translucent limestone of stalagmitic formation discovered by the French in the province of Oran, Algeria, and first brought into general notice at the London exhibition of 1862. It is used for the manufacture of mantel pieces, urns, and interior decorations, also for small ornaments, such as ink-stands, paper-weights. Much Mexican onyx or Tecalli marble is used for these purposes.

OOLITE, in petrology, a variety of limestone, composed of grains, like the roe of a fish, each of which has usually a small fragment of some organism or a grain of a mineral as a nucleus, around which concentric layers of calcareous matter have accumulated. In geology and palæontology, the term is not now generally petrological, but is chiefly chronological, being applied to a certain considerable portion of the Secondary period and to the strata then deposited. Some of the oölite limestones are excellent for building.

OORI, LIMPOPO, or CROCODILE RIVER, a river of S. E. Africa, has its sources in the heart of the Transvaal, between Pretoria and Potchefstrom, describes a huge curve to the N. and joins the Indian Ocean a little N. of Delagoa Bay. Its course exceeds 800 miles, and it has numerous tributaries, the most important being the Olifant from the right. The Limpopo has been ascended 50 miles by steamboat; but its upper reaches are obstructed by rapids and falls.

OOSTERHOUT, a city of Holland, in the province of North Brabant. It contains a town hall, a large Roman Catholic church, and a convent. It has manufactories of beet sugar, pottery, shoes, and iron. It has considerable trade in agricultural products and linen. Pop. about 15,000.

OOTACAMUND, or UTAKAMAND, the chief town in the Neilgherry Hills, the principal sanatorium of the Madras presidency, and the summer headquarters of the governor of Madras. It stands on a plateau, in an amphitheater surrounded by hills, 7,228 feet above the sea, 350 miles from Madras city, and 24 from the nearest railway station on the Madras line. There are a public library (1859), the Lawrence Asylum (1858) for the children of British soldiers, botanical gardens, the Breeks Memorial and Basel Mission buildings. Pop. 18,829.

OOZE, in geology, a stratum consisting of minute calcareous and siliceous tests derived from various foraminifers, etc., the wreckage of land, with volcanic ash here and there, found on ocean beds. It was discovered in the Atlantic, where it exists between 5,000 and 15,000 feet in depth, whence it is often called Atlantic ooze; but it occurs also in the Pacific. The ooze is an appropriate habitation for sea lilies, sponges, etc. It is identical with the material of which chalk is composed, and its deposition has gone on from Cretaceous times till now. In tanning, a solution of tannin obtained by infusing or boiling oak bark, sumac, catechu, or other tannin-yielding vegetable; the liquor of a tan-vat.

OPAL, a precious stone of various colors, which comes under the class of pellucid gems. It consists of silica with about 10 per cent. of water, and is very brittle. It is characterized by its irides-

cent reflection of light. It is found in many parts of Europe, especially in Hungary, in the East Indies, etc. The substance in which it is generally found is a ferruginous sandstone. There are many varieties or species, the chief of which are (*a*) precious or noble opal, which exhibits brilliant and changeable reflections of green, blue, yellow, and red; (*b*) fire opal, which simply affords a red reflection; (*c*) common opal, whose colors are white, green, yellow, and red, but without the play of colors; (*d*) semi-opal, the varieties of which are more opaque than common opal; (*e*) hydrophane, which assumes a transparency only when thrown into water; (*f*) hyalite, which occurs in small globular and botryoidal forms, with a vitreous luster; (*g*) menilite, which occurs in irregular or reniform masses, and is opaque or slightly translucent.

OPERA, a musical drama, that is, a dramatic composition set to music and sung on the stage, accompanied with musical instruments and enriched by the accessories of costumes, scenery, dancing, etc. The component parts of an opera are recitatives, solos, duets, trios, quartettes, choruses, etc., and they are usually preceded by an instrumental overture. The lighter kind of opera in Germany and England, as well as the French *opéra comique*, is of a mixed kind —partly spoken, partly sung. The chief varieties of opera are the grand opera or opera seria, the name given to that kind which is confined to music and singing, of which the recitativo is a principal feature; the romantic opera, or opera drammatica of the Italians, embracing an admixture of the grave and lively; the comic opera, or opera buffa; as well as many intermediate varieties. Though the Greek dramas were operatic in character, the opera proper is of modern date and of Italian origin, and would seem to have developed naturally from the miracle play of the Middle Ages, the first operas dating from the 16th century. About the close of that century the poet Rinuccini wrote a drama on the classical story of Daphne, which was set to music by Peri, the most celebrated musician of the age. There was no attempt at airs, and a recitative was merely a kind of measured intonation. Monteverde, a Milanese musician, improved the recitative by giving it more flow and expression; he set the opera of "Ariadne," by Rinuccini, for the court of Mantua; and in the opera of "Giasone" (Jason), set by Cavalli and Cicognini, for the Venetians (1649), occur the first airs connected in sentiment and spirit with the dialogue. The first regular serious opera was performed at Naples in 1615, and was entitled "Love Not Bound by Law." The first opera buffa is said to have been represented at Venice in 1624, where also the first stage for operas was erected in 1637. In 1646 the opera was transplanted to France by Cardinal Mazarin, about the same time to Germany, and somewhat later to England. In France there arose Lulli; in Germany, Keiser; in Italy, Scarlatti; and in England, Purcell, who are the chief operatic composers of the second half of the 17th century. The chief Italian operatic composers include, besides those already mentioned, Piccini, Jomelli, Cimarosa, Paisiello, in the 18th century, and Cherubini, Rossini, Bellini, Donizetti, Verdi, etc., in the 19th. Among the French composers are Grétry, Monsigny, Rousseau, Méhul, belonging to the 18th century, Boieldieu, Auber, Halévy, Herold, A. Thomas, and Gounod to the 19th. The chief recent composers of French comic opera are Offenbach, Lecoq, Hervé, Bizet, and Massinet. Among English composers of operas may be mentioned Arne and Shields in the 18th century; and of recent times Balfe, Wallace, Macfarren, Sullivan, Mackenzie, Thomas, Stanford, and De Koven and Herbert in the United States. It is the German composers, however, who have raised opera to the highest pitch of perfection, the list including such names as Handel, Gluck, and Mozart in the 18th century, Beethoven, Weber, Flotow, etc., in the 19th. Meyerbeer, though German by birth, is to be classed rather with the French composers. Richard Wagner was the leader of a school that changed the character of German operatic composition. In his work the vocal music is made subordinate to text, instrumentation, and scenic decoration. In the present century many novelties were introduced in lyric stage drama. The weird operatic music of the Russian composers Moussorgsky, and Rimsky-Korsakov made a wide appeal. Impressive, and to many startling in their departure from accepted convention were: Debussy's "Peleas and Melisande" (1902); Strauss's "Salome" (1905) and such variations on operatic themes as Stravinsky's pantomime-ballets "Petruchka" and "L'Oiseau du Feu." In the United States, American composers have in recent years engaged more actively in the lyric stage drama. The most important efforts since Damrosch's "Scarlet Letter" (1894) have been "Cyrano" by the same composer in 1903, Nevin's "Poia" (Berlin, 1910); Parker's "Mona" (1911); "Fairyland" (1913); "Shanewis" by

Charles Cadman (1918), and "The Legend" by J. C. Breil (1919).

OPERA BOUFFE, a farcical form of opera buffa in which the characters, subject matter, and music is intended to burlesque the more serious style of opera. Offenbach was the creator as well as the chief master in this art. The comic operas of Gilbert and Sullivan, both in the character of the music and the libretti, stand by themselves.

OPERA GLASS, a binocular telescope of the kind invented by Galileo. It has a plano-concave or double concave eye glass, so that the image is not inverted and little light is lost, thus securing great distinctness.

OPHIDIA, in zoölogy, snakes; an order of the class Reptilia, which is placed by Professor Huxley in his division Sauropsida. The body is always cylindrical and without a bony exoskeleton. Vertebræ procœlous, with rudimentary transverse processes. They have no sternum, pectoral arch, forelimbs, or sacrum; nor as a rule are traces of hinder limbs present, though they occasionally occur, *e. g.*, in Python. Hooked conical teeth are always present, anchylosed with the jaw. The order is preeminently tropical, the species rapidly diminishing as the distance from the equator increases, and wholly ceasing before the Arctic or Antarctic Circle is reached. The classification is not fixed. Acording to Wallace, the order contains 25 families. There is another and natural division into three sub-orders: (1) *Thanatophidia* (venomous snakes), with two groups, *Proteroglyphia* and *Solenoglyphia;* (2) *Colubriformes* (Innocuous colubriform snakes); and (3) *Typhlopidæ* (blind snakes).

OPHIR, an ancient country celebrated for gold. The ships of Solomon and Hiram, King of Tyre, brought 450 talents of gold to Jerusalem, 1000 B. C. Its position has not been ascertained, and Arabia, India, and Africa are contended for by different authorities. Josephus considers Malacca to be Ophir, and Sir Emerson Tennent supports this view. Purchas says Ceylon. But the discoveries made in 1868 of gold deposits on the E. coast of Africa, and the remains of the ancient workings, give additional force to the ideas entertained by many that thereabouts was the locality of Ophir.

OPHITE, green porphyry or serpentine, a metamorphic rock of a dusky-green color of different shades, sprinkled with spots of a lighter green. It is a hydrous silicate of magnesia with alumina and iron. Called also ophiolite.

OPHIUCHUS, in astronomy, Serpentarius, the Serpent-bearer, a constellation of the Northern Hemisphere. One of the ancient asterisms, having Hercules on the N., Scorpio on the S., and Serpens on the W. It has about 80 stars visible to the naked eye, the chief being Ras Alague.

OPHIUROIDEA, an order of the Echinodermata, comprising star fishes known as brittle stars and sand stars. These animals have long slender-jointed arms, which may either be branched or simple.

OPHTHALMIA, in pathology, a term used to indicate the structural changes produced by proliferation and catarrhal inflammation, going on to the formation of pus in the mucous membrane of the eye, exhibiting various forms, catarrhal, pustular, purulent (in the new-born infant), gonorrhœal, strumous, or scrofulous, and chronic. The chief symptoms are redness of the eye, chemosis, or swelling, discharge of fluid and pus, intolerance of light, and frequently, in severe cases, spasmodic closure of the eyelids. When the cornea is involved, destruction of the eye and permanent loss of sight—as in diphtheria and smallpox, or from sand, etc., as among the troops and natives in Egypt especially—is a common result. Treatment of the discharge by caustics and astringents is imperatively called for.

OPHTHALMOSCOPE, an instrument invented by Helmholtz, and described by him in 1851. It is used for the examination of the inner structure of the eyeball, and is composed of a small round mirror with a central perforation, which reflects the light of a lamp placed at the side of the eye. When the mirror only is used, the method is known as direct; when a convex lens is between the eye and the mirror it is indirect.

OPISTHOBRANCHIATA, in zoölogy, an order of Gasteropoda. Shell rudimentary or wanting; branchiæ arborescent or fasciculated, more or less completely exposed on the back and sides toward the rear of the body. It contains two sections, Tectibranchiata and Nudibranchiata.

OPIUM, in chemistry, the dried juice obtained from *Papaver somniferum*, extensively cultivated in Asia Minor, Egypt, and India. An incision is made in the unripe capsules, the juice is left to dry over night, and then removed with a blunt knife. Opium is a complex substance containing morphine (3–15 per

cent.), the most important alkaloid, narcotine, codeïne, narceïne, thebaïne, papaverine, meconic acid, meconin, resin, and fat, together with other substances, the composition of which is not clearly established. In pharmacy, in small doses it produces brief excitement, and then acts as a soporific. In large doses the sleep becomes coma, and death ensues. It is given to allay pain and spasm.

OPORTO, an important city and seaport of Portugal, on the Douro, 2 miles from its mouth, 174 miles N. E. of Lisbon. Situated on a steep declivity on the right bank of the river, the appearance of Oporto from the sea is picturesque and imposing. Oporto possesses many churches and convents, but no monument worthy of a special notice. There are four colleges, an academy of navigation and commerce, a school of medicine and surgery. Manufactures include silk, cotton, woolen and linen fabrics, ropes, tobacco, soap; also, shipbuilding. The harbor within the bar across the mouth of the Douro can only be entered by large vessels at high water. Owing to her situation, Oporto has an extensive commerce. The principal export is a red wine called port, produced on the banks of the Douro. The climate is generally damp and foggy; in winter the cold is very severe, but in summer the winds from the E., S., and W. moderate the intensity of the heat. Oporto occupies the site of the ancient Portus Cale, from which the name Portugal is derived. It was taken and sacked by the French in 1805. Pop. about 200,000.

OPOSSUM, in zoölogy, the popular name for the pouched mammals which have a geographical range from the United States to Patagonia. They vary

OPOSSUM

from the size of a mouse to that of a large cat, and have long noses, ears, and (generally) naked prehensile tails. The Virginian opossum (*Didelphys virginiana*), common over all temperate America, is the best-known of the family. The crab-eating opossum inhabits central and tropical South America. Lord Derby's opossum, like some others which have been placed in a separate group, has no pouches in which to carry its young; they commonly ride on their mother's back, twining their prehensile

WATER OPOSSUM

tails round hers. The Murine opossum, no larger than a common mouse, is bright red, and ranges from Central Mexico to the S. of Brazil. The most remarkable of the group, the three-striped opossum from Brazil, is reddish-gray, with three deep black bands down the back.

OPOSSUM SHRIMP, the popular name of several species of *Mysis*, a genus of small crustaceans. They receive their name from the females carrying their eggs and young in a pouch between the thoracic legs.

OPP, JULIE (MRS. WILLIAM FAVERSHAM), an American actress, born in New York, in 1871. She first appeared on the stage in 1896 in London, and was leading lady with Sir George Alexander for five years. She later was engaged by Charles Frohman and appeared as co-star with William Faversham for many years. She was married to Mr. Faversham in 1902. Author of "The Squaw Man." She died April 8, 1921.

OPPELN, a town of Prussian Silesia, on the Oder, 51 miles S. E. of Breslau. Since 1816, when it was erected into a seat of government for Upper Silesia, the town has been much beautified both with new edifices and with parks and gardens. Its church of St. Adalbert was founded in 995; and there is an old castle on an island in the Oder. The manufactures before the World War included pottery, cigars, cement, beer, leather, etc., and there was a considerable trade in grain and cattle.

OPPENHEIM, E. PHILLIPS, English novelist. He was born in 1866, and received his education at Leicester, Eng. He started writing in his teens and his work has achieved popularity in the United States and in Europe. His books include: "Enoch Stone"; "A Man and His Kingdom"; "A Millionaire of Yesterday"; "The Survivor"; "The World's

Great Snare"; "The Master Mummer"; "Anna the Adventuress"; "Mysterious Mr. Sabin"; "The Traitor"; "A Prince of Sinners"; "Mr. Wingrave"; "A Maker of History"; "The Secret"; "Conspirators"; "The Missioner"; "Jeanne of the Marshes"; "The Illustrious Prince"; "The Missing Delora"; "The Falling Star"; "Havoc"; "The Lighted Way"; "The Mischief Maker"; "The Game of Liberty"; "People's Man"; "Mr. Grex of Monte Carlo"; "The Double Traitor"; "The Hillman"; "The Wicked Marquis"; "The Curious Quest."

E. PHILLIPS OPPENHEIM

OPPENHEIM, JAMES, an American novelist and short story writer, born at St. Paul, Minnesota, in 1882. After studying for a time at Columbia University he became in 1905 the superintendent of the Hebrew Technical Schools for Girls in New York City. He resigned this position in 1907 to give himself entirely to literary work. His best known novels are "Doctor Rast" (1909); "Wild Oats" (1910); "Idle Wives" (1914). Besides novels he has written several volumes of poetry such as "War and Laughter" (1916); "The Book of Self" (1917).

OPPER, FREDERICK BURR, American artist, born in Madison, O., 1857; left school at fourteen to work in village newspaper office. Came to New York, worked there in a store, then, having sold some humorous sketches, "Wild Oats," took up illustrating as a profession. Was on art staff of Frank Leslie's three years; with "Puck" eighteen years, which he left to go on the New York "Journal." Has illustrated for Bill Nye, Mark Twain, Dunne (Mr. Dooley); is widely known from his "Happy Hooligan," "Alphonse and Gaston," and other "funny sheet" sketches.

OPPOSITION, in astronomy, the situation of two heavenly bodies when they are diametrically opposed to each other, or when their longitudes differ by 180°. Thus there is always an opposition of sun and moon at every full moon; also the moon, or a planet, is said to be in opposition to the sun when it passes the meridian at midnight. In logic, opposition of judgments is the relation between any two which have the same matter, but a different form, the same subject and predicate, but a different quantity, quality or relation. There are five kinds of opposition, viz., contradictory, contrary, inconsistent, subaltern, and subcontrary. In rhetoric, a figure whereby two things are joined which seem incompatible.

OPSONIN. A substance which is believed to exist in the blood, and whose function it is to stimulate the phagocites in their attack upon harmful bacteria, possibly by rendering these foreign micro-organisms more readily absorbable. The opsonic index is the ratio between the power of absorbing bacteria possessed by the blood under healthy conditions and that possessed under pathological conditions. In other words, the higher the opsonic index, the greater is the resistance of the body to disease. It has been found that the opsonic index can in certain diseases be raised by injecting into the blood dead bacteria of the species producing the disease.

OPTATIVE, in grammar, that form of the verb in which wish or desire is expressed, existing in the Greek and some other languages, its force being conveyed in English by such circumlocutions, as "may I," "would that he," etc.

OPTICAL ILLUSION. An object appears large or small, near or distant, according as the rays from its opposite borders meeting at the eye form a large or a small angle; when the angle is large, the object is either large or near; when small, the object must be small or distant. Experience alone enables us to decide whether an object of large apparent size is so on account of its real size, or of its proximity; and our decision is arrived at by a comparison of the object in posi-

tion with other common objects, such as trees, houses, etc. The same is, of course, true of apparently small objects. But when all means for comparison are removed our judgment is at fault. Similarly, we erroneously infer spherical solids at a distance to be flat disks, and a man in a white habit seems larger than he would if he wore a dark dress. Illusions are also produced by external causes.

The persistence of impressions on the retina for about one-sixth of a second after the object which produced the impression has been removed produces another class of illusions. Common examples of this are the illuminated circle formed by the rapid revolution of an ignited carbon point, piece of red-hot iron, or other luminous body. Another form of illusion is produced to a person who is seated in a vehicle in motion. The illusion is most complete when the attention is riveted on an object several yards off; this object then appears to be a center round which all the other objects revolve, those between the observer and the object moving backward, and those beyond the object moving forward. Other illusions arise from a disordered state of the organs of vision: *e. g.*, the seeing of things double or movable, or of a color different from the true one.

OPTIC NERVE, in anatomy, the nerve of sight, proceeding from the optic lobes or *corpora quadrigemina* to the eye, terminating in an expansion called the retina. The inner portion of the fibers of the two optic nerves decussates at the commissure, passing to the opposite eye, while the outer portion continues its course to the eye of the same side, which has been supposed to assist in the production of single vision, although it is more probable that the latter is the result of a mental act. The closest relations exist between the optic nerve, its disk, the retina, and the choroid, as regards the cerebral and intraocular circulation, particularly seen in the course of cerebro-spinal disease.

OPTIC NEURITIS. Condition of the optic nerve brought about by inflammation showing two distinct phases, namely, retrobulbar neuritis in which the nerve fibers behind the eye are affected, and papillitis, where the seat of inflammation is in the optic disk. The condition is often the result of brain disease, acute fevers, and syphilis, affecting the vision in common with other subjective symptoms.

OPTICS, in physics, that branch of knowledge which treats of the properties of light and of vision as performed by the human eye. The modern division of the science is into: 1. Sources of light; 2. Transmission, velocity, and intensity of light; 3. Reflection of light—mirrors; 4. Single refraction—lenses; 5. Dispersion and achromatism; 6. Optical instrument; 7. The eye considered as an optical instrument; 8. Phosphorescence and fluorescence; and 9. Double refraction, interference, and polarization.

OPTIMISM, in philosophy, the name given to the view propounded in the "Thédicée" of Leibnitz that this world, as the work of God, must be the best among all possible worlds. In general, the tendency to take the most hopeful view of matters in general; the belief that the world is growing better.

OPTOCHIN. Ethylhydrocupreine. $C_{19}H_{22}N_2OH.\ C.C_2H_5$. A derivative of cupreine, which occurs, together with quinine in the bark of *Remijia pedunculata*. It is a white, or faintly yellow powder, with a bitter taste. Almost insoluble in water. Possesses properties similar to those of quinine, and is used in the treatment of certain infections of the cornea of the eye. Internally the drug is uncertain in its action, and its administration has sometimes been followed by deafness and blindness, either temporary or permanent. For treating the eye a 2 per cent. solution of optochin hydrochloride is recommended.

OPTOGRAPHY, in optics, the temporary retention in certain cases of an image, that of the last person or thing seen, on the retina of the eye when a man or a beast dies.

OPTOMETRY. The science of measuring the vision and strength of the eye without the dilation of the pupil by the use of drugs, and the selection of proper lenses to correct defective vision.

The use of drugs to dilate the pupils while making an examination is not legal, except by a registered physician—an oculist.

The profession of optometry has been established by those opticians who desired to place their work on a higher plane than that occupied by the ordinary seller of optical goods. An organization was formed in 1904, and committees appointed who worked for legislative regulation of the practice of their profession. Minnesota was the first state to acknowledge the new profession, but now almost every state, as well as the Canadian provinces, recognizes and regulates it by legislative action.

The general requirements for the practice of optometry are a thorough knowl-

edge of the principles of the profession, which may have been gained either in a recognized school, or by employment under a practitioner of the profession, and a certain amount of high school work. Some colleges, notably Columbia, California, and Ohio State University, as well as the Rochester Athenium and Mechanics Institute, give training for this work, and schools teaching this subject alone have been established in Boston, New York, and Philadelphia.

Test cards of graduated letters, cases of assorted lenses, and specially designed instruments, usually reflectors or refractors of light, are used in making the tests, the instruments having the widest use being the skiascope, the ophthalmometer, the ophthalmoscope, and the phorometer. Various test lenses are placed before the eye which is being tested, until the lens which best corrects a certain determined defect is secured.

OPUNTIA, in botany, Indian fig; the typical genus of the family *Opuntidæ*. The stem consists of flat joints broader above than below, at length becoming cylindrical and continuous. All the species were originally American. *O. vulgaris* is indigenous in tropical America, Bermuda, etc., whence it has been introduced into Southern Europe; its fruit imparts a red tinge to the urine of those who eat it. *O. tuna* furnishes a rich carmine pigment, used in Naples as a watercolor. *O. dillenii* is used in the Deccan as a hedge plant about cantonments. Cochineal insects brought to India flourished on it, and it yields a coarse fiber used in paper making.

ORACLE, in anthropology, oracles are of high antiquity. They existed among the Egyptians (Herod. v: 89, viii: 82), and the poetry of the Greeks and the Romans is full of allusion to them. The Hebrews might lawfully, by the high priest, consult the Urim and Thummim (Num. xxvii: 21), but they also illicitly sought responses from teraphim (Judges xvii: 5), and from the gods of surrounding nations (II Kings i: 2, 3, 6, 16). The responses were supposed to be given by a supernatural afflatus, either through a person, as at Delphi and Cumæ, or through some object, as in the rustling of the sacred grove at Dodona. But in every case there is present the idea of a power more than human taking possession of a person or thing, and making that person or thing the vehicle of the response.

ORAN, a seaport of Algeria, stands on the Gulf of Oran, 261 miles W. by S. of Algiers, and 130 miles S. of Cartagena in Spain. It stretches up the foot of a hill, is defended by detached forts, has a thoroughly French appearance, having been mainly built since 1790, when the old Spanish town was destroyed by an earthquake, and possesses a Roman Catholic cathedral (1839), a grand mosque, a large military hospital, a college, a seminary, and two citadels or castles. The harbor is protected on the N. and E. by moles constructed in 1887 at a cost of $1,400,000; alfa, iron ore, and cereals are the chief of the exports. Oran was built by the Moors. During the second half of the 15th century it was a highly prosperous commercial town, and was celebrated for its cloth and arms and fine public buildings. But it was taken by the Spaniards in 1509 and made a penal settlement. It was captured by the Turks in 1708, but retaken by the Spaniards in 1732. In 1790 it was destroyed by an earthquake, and shortly after was altogether abandoned by the Spaniards, the Turks occupying it again in 1792. The French took possession of the town in 1831. Pop. about 125,000.

ORANG OUTANG, in zoölogy, *Simia satyrus*, the Mias of the Dyaks; also known as the "wild man of the woods." It is a dull, slothful animal, but possessed

ORANG OUTANG

of great strength. These animals are now confined to the swampy forests of Sumatra and Borneo. Their height has been variously stated, but we have not the least reliable evidence of the existence of orangs in Borneo more than four feet two inches high. The legs are very short, the arms are disproportionately long, reaching to the ankle when the ani-

mal is placed in an erect position. The hair is long, ruddy-brown, with a decidedly red tinge, face dark, eyes and nose small, jaws prognathous, the hair falling over the forehead and backward over the neck; it is long on the limbs, with a downward direction on the upper, and an upward on the lower arm. There are neither cheek pouches nor natesal callosities, nor a tail, and the hips are covered with hair. The males have a longish beard, and they sometimes develop warty protuberances on each side of the face. The resemblance to man in appearance is greatest in the females and in young animals. The head of a baby orang is not very different from that of an average child; but in the adult the muzzle is as well-marked a feature as in the Carnivora. The orang is arboreal, and forms a sort of nest or shelter among the trees. It never walks erect, unless when using its hands to support itself by branches overhead, or when attacked.

ORANGE, properly *Citrus aurantium*, the sweet orange. The leaves are ovate, oblong, acute, slightly serrulated; petiole more or less winged; the pulp is sweet. It is a native of India, and by some botanists is believed to be only a variety of the citron (*C. medica*). It was intro-

ORANGE

duced into the S. of Europe about the 12th century, having been brought into Arabia about three centuries earlier. It lives about 600 years. Among the many varieties are the China orange, which is the common orange of the markets; the blood, or Malta orange; the St. Michael's orange; the noble, or mandarin orange; the navel, or seedless, etc. The orange contains malic acid; the rind is bitter and aromatic; the fruit itself is said to be disinfectant. Orange poultice has been recommended in India in skin diseases. There are various allied species, specially the bitter, or Seville orange, *C. bigaradia*, largely imported for the manufacture of candied orange peel, etc. It, too, has run into several varieties. In Florida and Southern California vast orange plantations are providing immense crops of many varieties of the orange. In 1918-1919 California shipped over 49,063 carloads of citrus fruits, worth more than $100,000,000.

ORANGE, or **GARIEP**, the largest river of South Africa, rises in the Kathlamba Mountains, in the E. of Basutoland, and flows W., with an inclination to the N., to the Atlantic ocean. It describes numerous wide curves in its course of 1,000 miles, and separates Cape Colony, on the S., from the Orange Free State, Griqualand West, Bechuanaland, and Great Namaqualand, on the N. Area of basin, 325,000 square miles. Its principal tributaries are the Caledon and the Vaal, both joining it from the right. Its volume varies greatly between the dry season, when it is not navigable, and the rainy season, when it overflows its banks in the upper part of its course. Its mouth is, moreover, obstructed by a bar.

ORANGE, anciently Arausio, a city and commune of France, 18 miles N. of Avignon, on left bank of the Aigue, tributary of the Rhone. There are two great monuments of the Roman period, a triumphal arch (72 feet high), the finest in France, and the ruins of a theater, 340 feet long; the only modern building of interest is the cathedral. For five centuries (till 1531) Orange was an independent principality ruled by its own sovereigns, the estates and title passing to the Count of Nassau, and thus to William III., afterward King of Great Britain. In 1713 Orange was for certain equivalents conceded to France by the King of Prussia, though the title of prince has descended by the younger Nassau line to the kings and stadtholders of Holland. The district is very productive; manufactures silks, woolens, and fruits.

ORANGE, a town of Connecticut, in New Haven co. It is on the New York, New Haven, and Hartford railroad. It is chiefly a farming community, but its industries include the manufacture of automobiles, ribbons, and buckles. Pop.,

including West Haven borough, (1910) 11,272; (1920) 16,614.

ORANGE, a city in Essex co., N. J.; on the Lackawanna railroad; 4 miles N. W. of Newark. It is built on the lower slopes of the Watchung Mountain, and in its vicinity are Eagle Rock, 650 feet above tide-water, Hemlock Falls, a wild mountain attraction, and Llewellyn Park, which comprises 750 acres, and contains many costly residences. Here are the Orange Memorial Hospital, House of the Good Shepherd, a Masonic temple, Orphan Home, a public library, National banks, daily and weekly newspapers. It has extensive manufactories, and industries of importance. Pop. (1910) 29,630; (1920) 33,229.

ORANGE, a city of Texas, the county-seat of Orange co. It is on the Sabine river, and on the Intercoastal canal, and on the Orange and Northwestern and the Texas and New Orleans railroads. It has important lumber interests. It is a shipping center for rice, cotton, and live stock. Its industries include the manufacture of lumber, paper, and oil. Pop. (1910) 5,527; (1920) 9,212.

ORANGE, FORT, an old fort built by the Dutch in 1623, on the site of the present city of Albany, N. Y.

ORANGE, PRINCE OF. See WILLIAM THE SILENT, PRINCE OF ORANGE: WILLIAM III., KING OF ENGLAND: MAURICE.

ORANGE FREE STATE PROVINCE, formerly Orange River Colony, a state of the Union of South Africa. It has Cape Colony on S. and S. W., Bechuanaland on N. W., Transvaal Colony on N., Natal on E., Basutoland on S. E.; area estimated at 50,389 square miles, divided into 19 districts; pop. Europeans about 200,000. Native and colored, about 400,000. Capital, Bloemfontein. Lying about 5,000 feet above the sea-level, the country, chiefly vast undulating plains, is cold in winter, with violent thunder storms and long droughts in summer. It is, however, very healthful, and favorable to European constitutions. Agriculturing and pasturing are the chief occupations, and wool, hides, and ostrich feathers the principal exports. Diamonds and other precious stones have been found in paying quantities, rich coal mines exist, and the State is said to abound in other mineral wealth. Gold was discovered in 1887. The Dutch Reformed Church is the dominant religion, and a Dutch dialect the language of the country. The country may now be reached by railway from Port Elizabeth. The colony was founded in 1835-1836 by Dutch settlers from Cape Colony, annexed by Great Britain in 1848 in order to put a stop to the Boer outrages on natives but in 1854 it was recognized as an independent State.

The great discovery of diamonds on the banks of the Vaal river, in May, 1870, led to conflicting claims by the Orange Free State and the Transvaal Republic but in October, 1871, the British annexed the disputed territory (See KIMBERLEY). In the summer of 1899, the relations becoming strained between the South African Republic and the British government, the Orange Free State declared its intention of supporting the latter in the event of war (See TRANSVAAL COLONY). After the defeat of the Boer forces, a military governor was appointed over the Orange Free State (March, 1900). Its annexation to the British empire was formally proclaimed at Bloemfontein, May 28. On Sept. 5, Lord Roberts issued a proclamation defining the policy of the British government in regard to the conquered State. See BOERS.

ORATION, an elaborate speech or discourse, composed according to the rules of oratory, and delivered in public, and treating of some important subject in elevated and dignified language; an eloquent speech prepared beforehand and spoken in public.

ORATORIO, a kind of musical drama, consisting of airs, recitations, duets, trios, choruses, etc. The text is usually derived from some Scriptural subject; as, for instance, that of the "Messiah," of the "Creation," and of "Elijah." The origin of the oratorio is somewhat obscure. The most probable account is that which attributes its intention to St. Philip Neri, who, in 1548, organized, at the new chapel at Rome, certain musical performances, consisting of poems on sacred subjects, sung by first-rate singers, accompanied by the best instrumentalists, for the purpose of attracting large congregations. It was entirely successful, and these performances, which at first were only poems in four parts, were, in less than half a century after the death of Neri, in 1595, developed into those splendid compositions called by moderns oratorios. Italy, though the birthplace of the oratorio, has produced very few of any note. The Germans, on the contrary, excel in this species of composition; as a proof of this, it is only necessary to mention the names of Bach, Haydn, Beethoven, Mozart, and, greatest of all Handel.

ORATORY, an apartment in a private house or building designed for domestic worship. It differs from a chapel inasmuch as it contains no altar, nor may mass be performed in it.

ORBICULINA, a genus of minute foraminifers, found alive in tropical seas, as also fossil in the Tertiaries. They have their name from their flattened globular shape.

ORBIT, in anatomy, the bony cavity in which the eye is situated. In astronomy, the path of a primary planet in its revolution round the sun, or a secondary one in its revolution round the primary. In ornithology, the skin which surrounds the eye of a bird.

ORCHARD, an inclosure devoted to the culture of fruit trees, especially the apple, the pear, the plum, the peach, and the cherry. The most suitable position for an orchard is a declivity lying well exposed to the sun and sheltered from the colder winds. Fruit cultivation is carried on most extensively on the continent of Europe and the United States. The chief fruit-growing States are New York, Ohio, Michigan, Illinois, Pennsylvania, Delaware, New Jersey, Maryland, Indiana, California and Oregon.

ORCHARDSON, WILLIAM QUILLER, an English genre painter; born in Edinburgh, in 1835, where subsequently he studied under Scott Lauder at the Trustees' Academy; became A. R. A. in 1868, R. A. in 1877, and received a Medal of Honor at the Paris Exposition, in 1878. Best known among his highly-popular pictures are "The Challenge" (1865), "The Duke's Antechamber" (1869). "Casus Belli" (1870), "The Protector" (1871), "The Bill of Sale" (1875), "The Queen of the Swords" (1877), "A Social Eddy" (1878), "Hard Hit" (1879), "On Board H. M. S. 'Bellerophon,' July, 23, 1815" (1880; bought by the Chantrey Bequest). "Marriage de Convenance" (1884), "After" (1886), "The Salon of Madame Récamier" (1885), "The First Cloud" (1887), and "The Young Duke" (1889). He died April 13, 1910.

ORCHELLA, name of several species of *Roccella*, a genus of lichens, originally brought from the Levant, and employed from very early times as a dye agent. Large quantities are gathered in the maritime rocks of the Canary and Cape Verde Islands. A purple and a red dye, known as orchil or archil, are prepared from them.

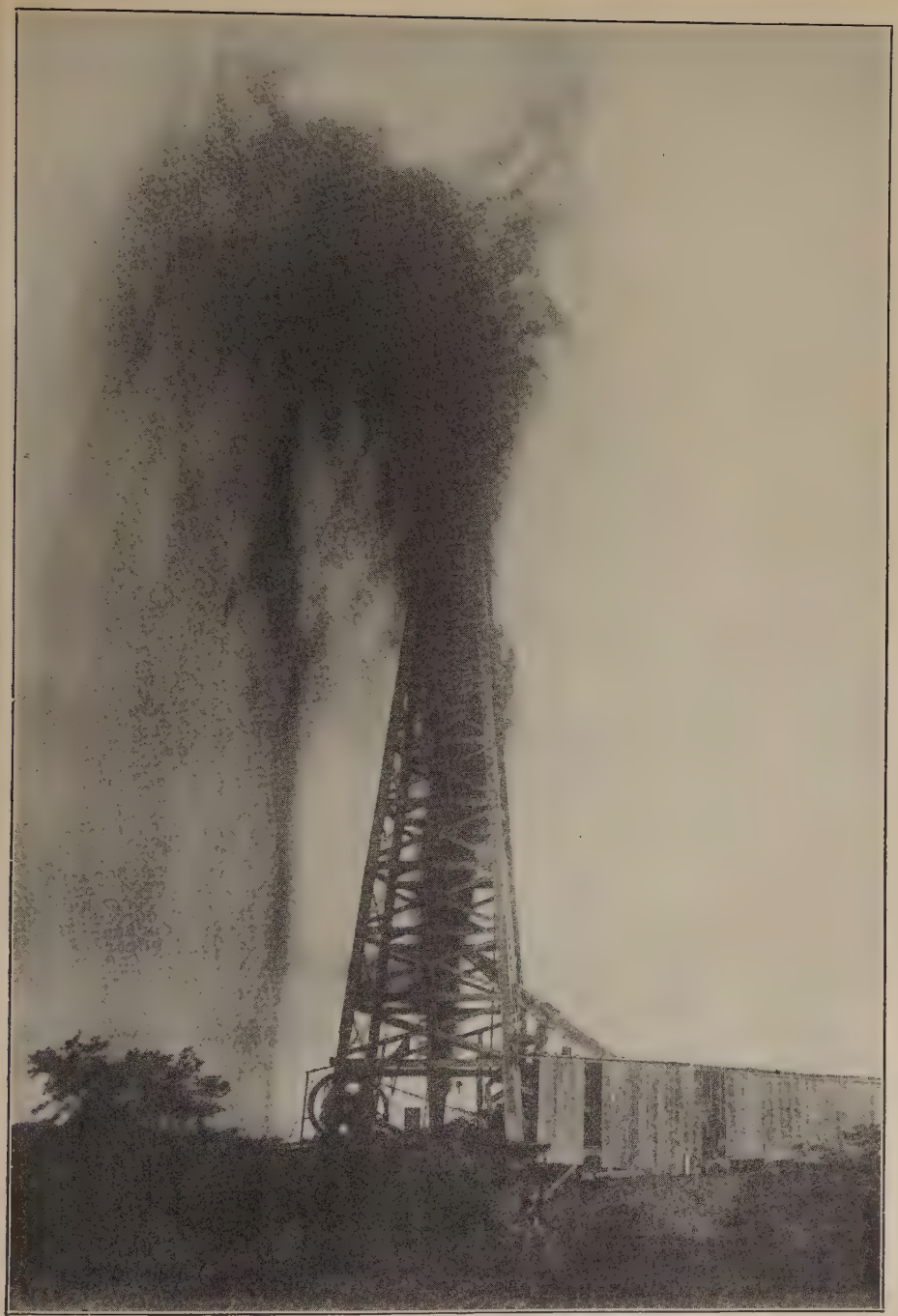
ORCHESTRA, or **ORCHESTER**, in Greek and Roman theaters, the semi-circular area, included by the straight line which bounded the stage in front of the first row of the ascending steps. In the Greek theater this space was always occupied by the chorus. In Roman comedy there was no chorus; and in Roman tragedies, both the chorus and the musicians were placed upon the stage itself, the whole of the orchestra being reserved for the senators. In modern theaters, etc.: (1) The place where the band, or band and chorus, are placed in modern concert-rooms, theaters, etc. (2) The collection of instruments of varied compass and quality of tone which constitutes a full band. There are no orchestral scores earlier than the latter part of the 16th century, so all statements as to concerted instrumental music before that time are wholly conjectural.

ORCHESTRION, an instrument of the organ type devised to reproduce the playing of all the wired instruments of the orchestra. The first orchestrion is claimed as the invention of a native of Karlsruhe, Baden, named Welte, whose son made the instrument more commercially possible by the use of paper rolls as reed pipes. In recent years the orchestrion has been still further developed for use in places of amusement.

ORCHIDACEÆ, orchids; the typical order of the alliance Archidales. It consists of perennial herbs or shrubs, with fibrous, fasciculated, fleshy, or tuberlike roots. All the species are terrestrial in temperate latitudes; in the tropics many are epiphytes, growing on trees. They are remarkable for their irregular flowers, often very beautiful, sometimes very fragrant. Found in nearly all climates. Known genera 400; species 3,000. Divided into seven tribes: Malaxeæ, Epidendreæ, Vandeæ, Ophreæ, Arethuseæ, Neotteæ, and Cypripedeæ.

ORCHIS, the typical genus of the order *Orchidaceæ*. It is one of the tribe Ohreæ or Orphrydeæ, and the family *Serapiadæ*. The tubers are globose, ovoid, or palmate; the lip is spurred; the glands of the stalks of the pollen masses contained in a common little pouch. Chiefly grown in the N. temperate zone. About 80 kinds are known.

ORCHOMENOS, an ancient city of Bœotia, the capital of the kingdom of the Minyæ; situated at the N. W. corner of Lake Copïas, where it is joined by the Cephissus, and extended from the marshy edges of the lake up the face of a steep rock hill, on which stood the acropolis. It sent 30 ships to the Trojan war, and at a later date became a member of the Bœotian confederacy. Its government



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AN OIL WELL SOUTH OF TAMPICO, MEXICO

Photo, Ewing Galloway

A MODERN OIL-DELIVERY STATION

©E. M. Newman

OLIVE TREES ON A SLOPE NEAR GRANADA, SPAIN

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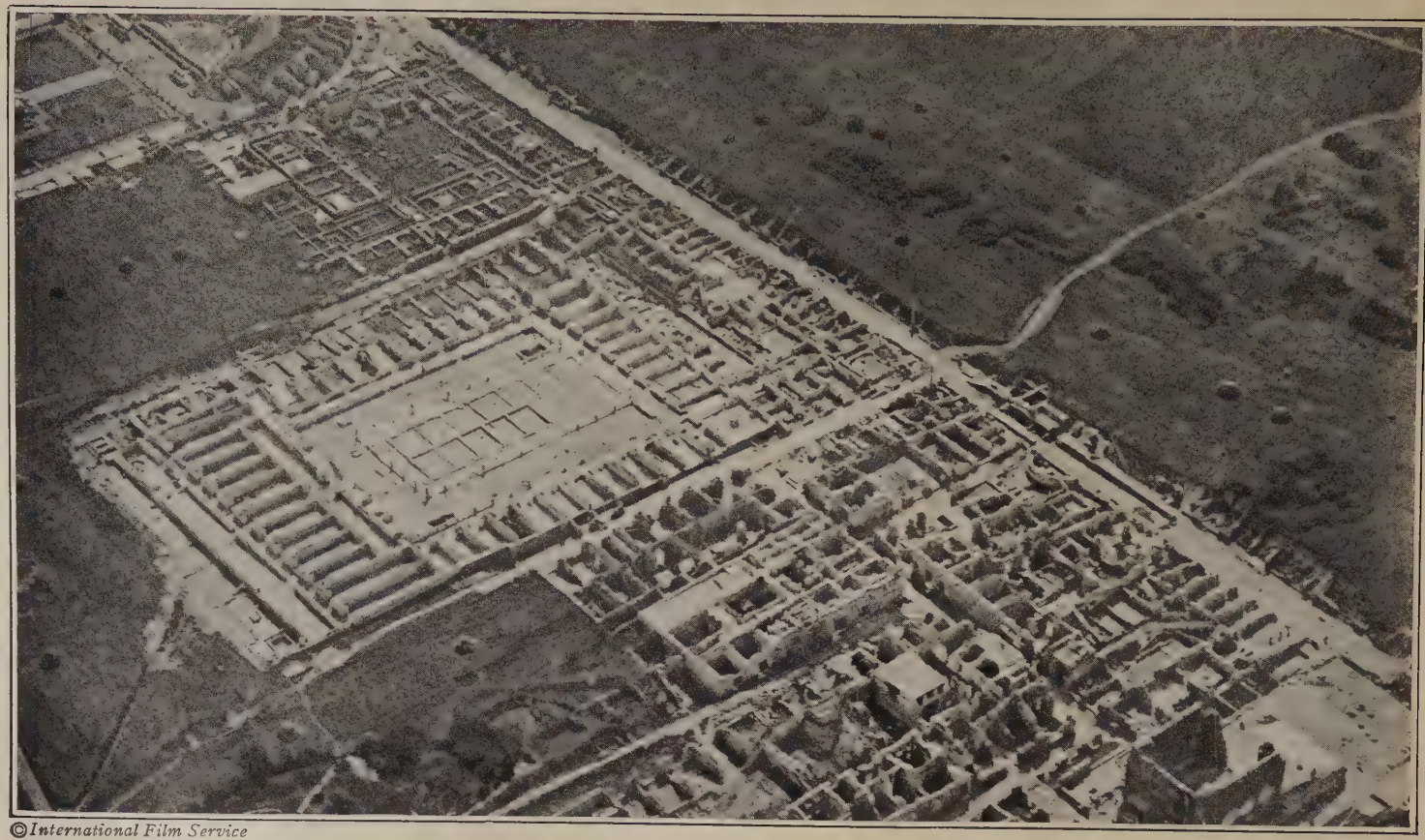
A VIEW OF THE HARBOR OF OPORTO, PORTUGAL



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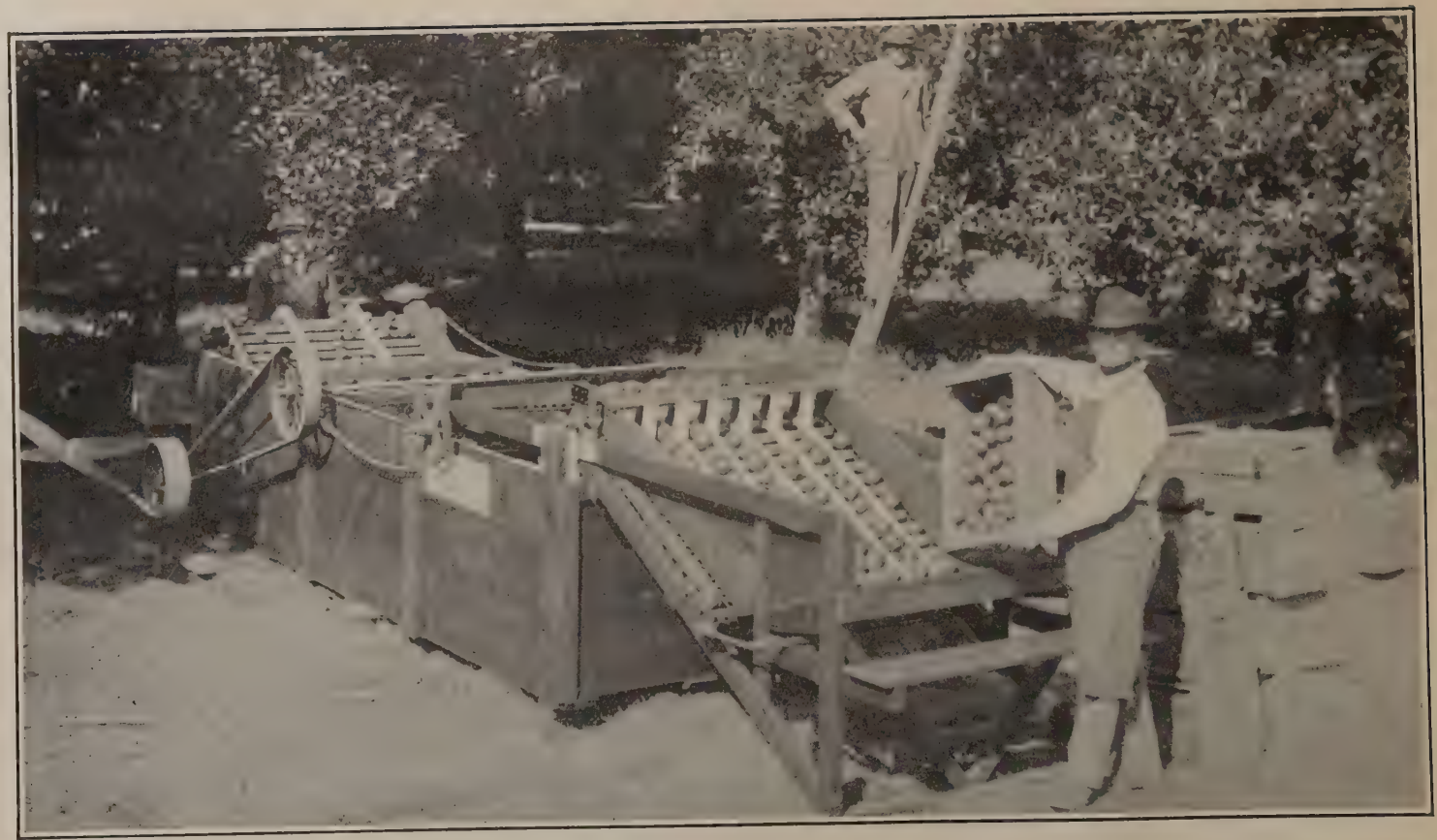
RUINS OF OSTIA, THE ANCIENT PORT OF ROME. THE LOCATION WAS THEN AT THE MOUTH OF THE TIBER



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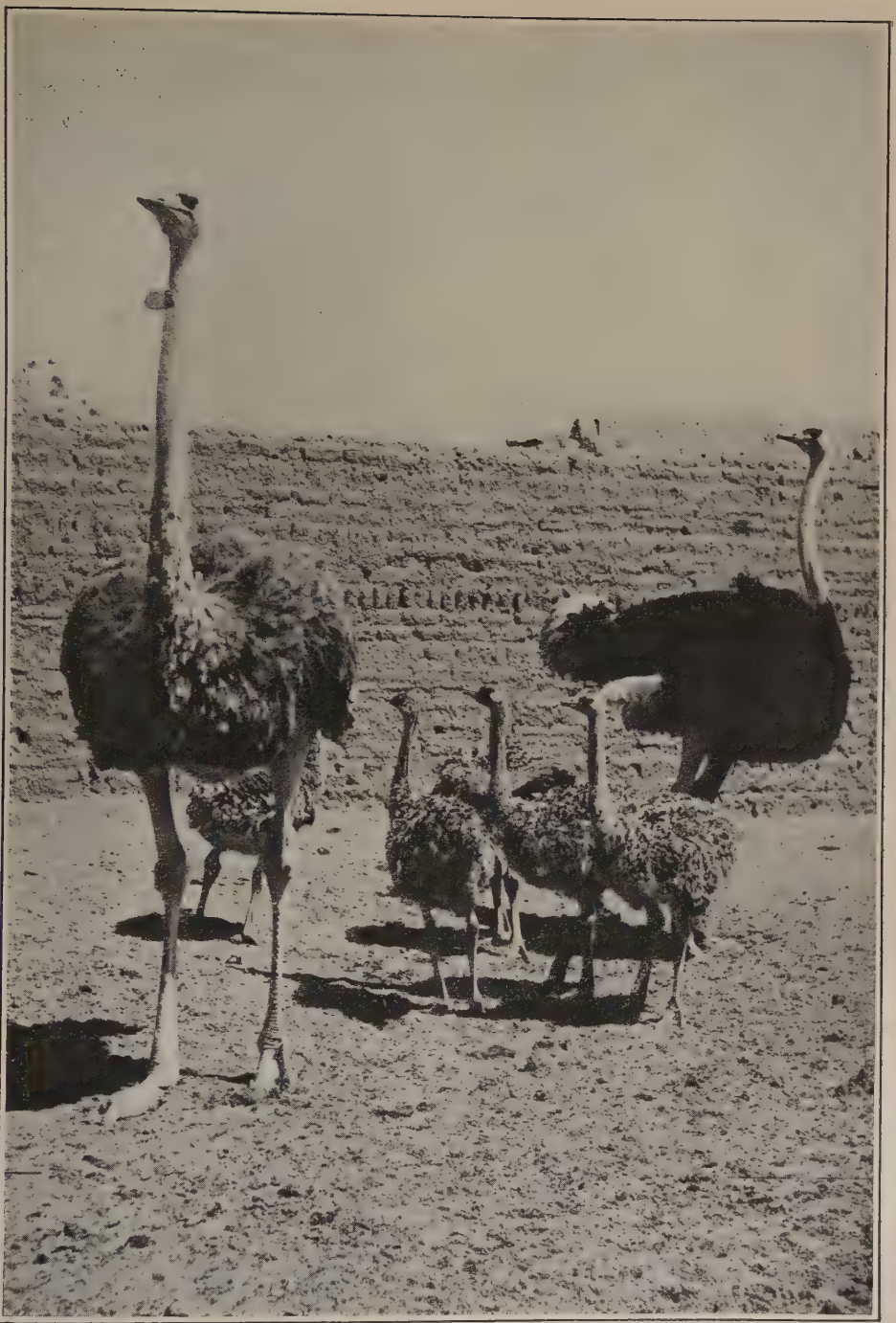
A GRAVITY-TEST SORTING MACHINE FOR SORTING ORANGES BY WEIGHT. A MECHANICAL DEVICE CARRIES THEM OUT BY DIFFERENT CHUTES



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OSTRICH AND YOUNG ON AN OSTRICH FARM IN MARARIYEH, EGYPT

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AN AVIATOR'S VIEW OF THE CITY AND UNIVERSITY OF OXFORD, ENGLAND

was thoroughly aristocratic, and after the Peloponnesian war the jealous democratic Thebans destroyed it by fire, and sold its inhabitants as slaves. It was rebuilt in the reign of Philip of Macedon, but never recovered its position. It was famous for its musical festival in honor of the Graces, who were specially worshiped in the city.

ORCHIDS

1. Calyso Borealis.
2. Moccasin Flower.
3. Ladies' Dresses.
4. Snake Mouth.

ORCZY, BARONESS (MRS. MONTAGU BARSTOW), Hungarian playwright and novelist, born in Tarnaörs, Hungary, educated in Brussels, studied art and exhibited in England, where she married Montagu Barstow. Began writing in 1900, and first became known for her brilliant detective stories, known as "The Old Man in the Corner" Series. Among her best known works are: "The Scarlet Pimpernel" (1905); "A Son of the People" (1906); "Flower o' the Lily" (1918); and "His Majesty's Well-Beloved" (1919).

ORDEAL, the *judicium Dei* of mediæval writers; the practice of referring disputed questions (especially those touching the criminality of a suspected person) to supernatural decision, in the belief that the Deity would work a miracle rather than the innocent should suffer or the guilty escape punishment. It existed among the Jews. A wife accused of adultery was required to drink "the bitter water that causeth a curse" (Num. v: 12–31), and a strangely similar institution exists at the present day among the negroes of the Gold Coast of Africa; and ordeal in some form or other is still practiced by races of low culture, and by individuals of low culture among races standing in the forefront of civilization. In the Middle Ages in Europe ordeal was sanctioned both by civil and the ecclesiastical authorities, and was chiefly of three kinds: (1) By fire—a survival from the early classic times, in which the accused had to walk barefoot and blindfolded over red-hot plowshares, or to take up and carry a piece of red-hot iron a certain distance. This method was allowed only to persons of high rank; (2) By water, for persons of the middle and lower classes. This was of two kinds. The accused had to take a stone out of boiling water, and if, after a certain time, his arm presented no marks of injury, he was adjudged innocent. In the second case—a common method when witchcraft was alleged—the accused, bound hand and foot, was thrown into a river or pond, and it was believed that a guilty person would float without effort, and that an innocent person would infallibly sink; (3) Wager of battle. Besides these three principal methods there were three others in less general use: A supposed murderer was required to touch the body of the murdered man, and was pronounced guilty if blood flowed from the wounds; the Ordeal of the Eucharist, in which divine judgment was supposed to follow unworthy reception of the sacrament; and the Corsned.

ORDEAL TREE, in botany: Of Guinea, *Erythrophlæum guineense;* of Madagascar, *Cerbera tanguin.* The fruit, which is poisonous, is given in some kind of broth to the accused person. If he recover, he is deemed innocent; if he die, this is to be held to prove his guilt.

ORDER, in archæology, the different modes of architectural treatment adopted by the ancients in constructing their public edifices and buildings of the higher class. They are usually separated into five, principally distinguished from each other by the proportions of their columns and the kind of capitals employed, but also by the relative proportions and decorative parts of their entablatures, as well as other minor features. They are known as the Doric, Ionic, Corinthian, Tuscan and Composite. In ecclesiastical affairs, in the Roman Church, "a Sacrament of the New Law by which spiritual power is given, and grace conferred for the performance of sacred duties." The Council of Trent (sess. xxiii.) asserted, and anathematized those who denied (1) that there was a real priesthood in the New Law; (2) that, besides the priesthood, there were grades of orders; (3) that Order was a Sacrament instituted by Christ; (4) that the Holy Ghost was given and a character conferred at ordination; (5) that unction was properly used in ordination; (6) that there was a divinely appointed hierarchy in the Roman Church; (7) that bishops were superior in power to priests, and were the ministers of Confirmation and Order; and (8) that bishops appointed by the Roman Pontiffs were true and legitimate bishops. The doctrine of Apostolical Succession is a necessary deduction from the view that Order is a Sacrament. Orders in the Roman Church are divided into two classes: Sacred, or Major, and Minor Orders. In the East the number of orders has varied at different times, but in the Greek, Coptic, and Nestorian Churches the orders recognized are those of bishop, priest, deacon, subdeacon, and reader. Anglicans acknowledge three: bishops, priests, and deacons. The validity of Anglican Orders is denied by the Roman Church. English clerics entering that church, and wishing to become priests, must be ordained by a Roman bishop. In geometry, rank or class. In analysis, magnitudes are classed into orders, depending upon the degree of their equations. All algebraic magnitudes whose equations are of the first degree are of the first order; those whose equations are of the second, third, etc., degrees, are respectively of the second, third, etc., orders. In natural science, the designation given to the division immediately below a class or sub-class and next above a tribe or a family. In rhetoric, the placing of words and members in a sentence in such a manner as to contribute to force and beauty of expression, or to the clear illustration of the subject.

ORDERS, MILITARY, fraternities or societies of men banded together in former times for military and partly for patriotic or Christian purposes. Free birth and an irreproachable life were the conditions of admission. The chief were the Templars, the Teutonic Knights, and the order of St. John of Jerusalem.

ORDERS, RELIGIOUS, associations, the members of which band themselves to lead strict and devotional lives, and to live separate from the world. Prior to their formation there were only the hermits or anchorites (see MONASTERY). The entry into religious orders from their foundation to the present time, is preceded by the taking of the monastic vow, which enjoins residence in a monastery, celibacy, renunciation of worldly pleasures, the duty of prayer, fasting, and other austerities, and unconditional obedience to superiors. The first properly constituted religious order was founded in the 4th century by St. Basil, now chiefly confined to the Greek Church in the East. In the time of Justinian (530), St. Benedict established a new order, the Benedictines, under a set of rules based principally on those of St. Basil, and for some 600 years after the greatest number of European monks followed his statutes. According to some authorities as many as 23 orders sprang from this one. About 1220 the Dominicans and Franciscans originated by taking amended rules from their leaders. These rules, especially those of the Dominicans, were more austere, including perpetual silence, total abstinence from flesh, and the wearing of woolen only, and they were not allowed to receive money, and had to subsist on alms, being thus "mendicant" orders. Modified orders of the Benedictines are, for instance, the Camaldulians or Camaldolites, the Carthusians, the Celestines, the Cistercians, the Bernardines, Feuillants, Recollets, the nuns of Port Royal, and the Trappists. In the 8th century the monks began to be viewed as members of the clerical order, and in the 10th, by receiving permission to assume the tonsure, they were formally declared clergymen. The Præmonstratenses, Servites, Augustines, Hieronymites or Jeronymites, Jesuits, and Carmelites are regu-

lar orders, according to the rules of St. Augustine. Suborders of the Franciscans are the Minorites, Conventuals, Observatines, Fraticelli, Cordeliers, Capuchins, Minims, etc. As the secluded life of the monks, soon after the origin of monasteries, had given rise to similar associations of pious females, so nuns commonly banded together as new orders of monks arose, and formed societies under similar names and regulations. Thus there were Benedictine, Camaldulian, Carthusian, Cistercian, Augustine, Præmonstratensian, Carmelite, Trinitarian, Dominican, Franciscan nuns, and many other orders of regular canonesses. There were also congregations of nuns who united with certain orders of monks without adopting their names. The Ursuline and Hospitaller nuns, or Sisters of Mercy, are female orders existing independently of any male orders, and living according to the rules of St. Augustine. The orders first established governed themselves in an aristocratico-republican manner. The Benedictine monasteries were long independent of one another. The Cistercians obeyed a high council made up of the superior, and other abbots and counsellors, and these were again responsible to the general chapters. The four mendicant orders, the Dominicans, Franciscans, Augustines, and Carmelites, at their very commencement placed themselves in a much more intimate connection with the Popes.

ORDERS IN COUNCIL, orders by the ruling sovereign with the advice of the privy council. See PRIVY COUNCIL.

ORDINATE, in analytical geometry, the ordinate of a point is one of the elements of reference, by means of which the position of a point is determined with respect to fixed straight lines, taken as co-ordinate axes. The ordinate of a point to a diameter of a conic section is the distance of the point from that diameter, measured on a line parallel to a tangent drawn at the vertex of the diameter. The ordinate to a diameter is equal to half the chord through the point which is bisected by the diameter.

ORDINATION, the act of conferring the sacrament of order in the Roman Catholic Church. Women are incapable of being validly ordained (I Cor. xiv: 34; I Tim. ii: 11, 12). Ordination is, in the normal course of things, conferred by bishops, but abbots may confer minor orders on their subjects. Dismissory letters are necessary if a man is to be ordained for a diocese other than that in which he was born, and he must have legitimate and sufficient title. Ordination to sacred orders, according to the general law of the Church, can only take place on the Saturdays in the four Ember weeks, on the fifth Saturday in Lent, or on Holy Saturday, and always during mass. Minor orders can be conferred at general ordinations, and also on any Sunday or holiday, not necessarily during mass.

In the United States Protestant churches have each their own method of ordination, which is rather a service of consecration than a sacrament imparting special power. The ordination in the Episcopal Church is patterned largely after that of the English Episcopal Church.

ORDNANCE. Although artillery weapons, equipment, such as wagons, caissons, and limbers, machine guns, rifles, small arms, hand grenades, harness and ammunition of all kinds are included in the general class of military supplies known as ordnance, this article will consider only the features of construction of the artillery weapon and its mount.

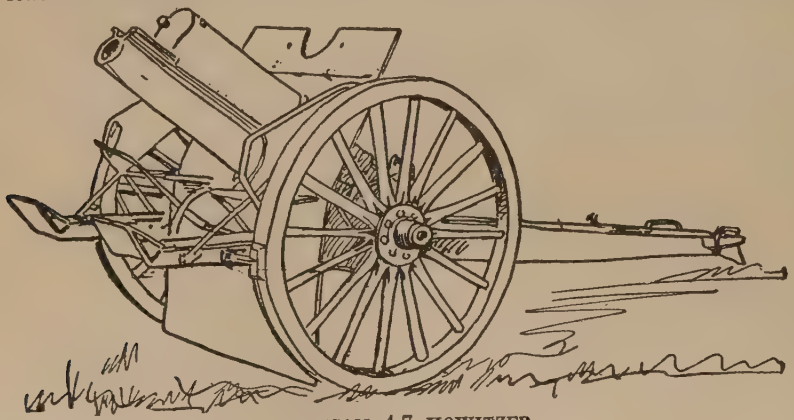
Artillery weapons are of three types, guns, mortars and howitzers. Of each type there are various models, the style, size and power of which are determined by the use for which the weapon is intended. Guns are of three main classes, field, siege and coast defense weapons. In the United States Army field guns are again classified. Those under six inches in diameter are known as light artillery and are operated by the field artillery, while every gun of more than six inches is classed as heavy artillery, and is operated by the coast artillery corps. A gun is fired from a low angular muzzle compared to that of a mortar, the elevation frequently being as low as 15°, and seldom exceeding 40°, while a mortar is designed to fire with a muzzle elevation of 65° to 70°. The barrel of a gun is usually longer than that of a mortar of the same caliber, and because of that fact, the expanding gases from the explosion have a longer time to act and a higher muzzle velocity results from a charge of power of the same power. A siege weapon is either a large gun or mortar placed on some sort of a mobile mount such as a caterpillar platform or a special railway mount. A howitzer is a short weapon usually of comparatively light weight, and so designed that its projectile will have an abrupt fall.

It is a long step from the catapult of ancient days to the gun with which the Germans bombarded Paris from a distance of over seventy miles, but as a

matter of fact real progress in ordnance has been comparatively modern.

In spite of the fact that gunpowder was known to China and the far east for years before it was known in Europe, credit should go to the West for the first use of guns as they are now understood. Little attention was paid to the design of the gun or to the strength of the charge in early days, and the first models were frequently more dangerous to their crews than to the targets.

Early guns were made of wrought or cast iron or bronze, and gradually increased in size and weight in order to secure greater strength. They were of course loaded at the muzzle and fired by



AMERICAN 4.7 HOWITZER

a fuse. The modern gun is made of steel, and only selected parts of special ingots are used. The ingot is cast in the rough form of the gun, bored on a special lathe, then heated and forged on a mandrel, then annealed, then turned and bored to size, tempered and again annealed.

The inside of the gun or tube is bored and reamed by a special machine which assures straightness. The outer part or jacket is heated and consequently expanded and dropped over the tube, where it cools and shrinks to position. The several parts of the gun are assembled in this fashion. The assembled gun is then rifled, turned to final size on the outside, the powder chamber and breech rest are finished, and the gun fitted with a breech lock of either a sliding or interrupted screw type.

The function of a gun carriage is to support the gun as it is fired, and in the case of mobile guns to furnish a means for transportation. A means for compensating the enormous force of recoil has been the subject of much study on the part of designers of ordnance, and many devices using springs, air or water have been introduced and many perfected. In the French 75 millimeter gun, acknowledged the most successful field piece of the World War, its outstanding superior feature was its hydro-pneumatic recoil mechanism.

ORDOVICIAN, a name sometimes given to a geological formation intermediate between Cambrian and Silurian; otherwise accounted the Lower Silurian strata. It is so called from the Ordovices, an ancient British tribe.

ORDWAY, SAMUEL HANSON, an American lawyer, born in New York City in 1860. Graduated from Brown University in 1880 and took a post-graduate course in Harvard. He was admitted to the bar in 1884, and from that time practiced law in New York City. He was a member of many important commissions, including one appointed by Governor Hughes to investigate speculation in securities and commodities. Active in civil service reform work and for years chairman of the executive committee of the Civil Service Reform Association. He wrote many articles and delivered many addresses on civics and economics.

ORE, substances found in the earth from which metals are obtained by various processes, but chiefly by roasting and smelting. Ore consists of metals mineralized by chemical combination with one or more of the non-metallic elements. Generally speaking, however, all mineral substances containing metals, combined or free, are called ores. They are found in veins or lodes, in bedded masses, and also disseminated in rocks of all ages, both igneous and stratified

sedimentary. In the latter, the ores of iron and manganese are the most abundant, and often found in beds of large extent. Some ores, as well as native metals, are also found in alluvial deposits; gold, platinum, etc., in those known as placers. Placer products, sometimes called placer ores, have been derived from the degradation and wearing away of older rocks, the minerals having been washed out and redeposited by the agency of water.

OREADS, in Greek mythology, nymphs of the mountains.

ORE DEPOSITS. Any considerable accumulation of metal bearing matter in the crust of the earth. A metalliferous rock is spoken of as an ore when it contains metallic minerals (or in some cases non-metallic minerals, such as sulphur) in such quantities and mixtures as to make possible their profitable extraction. The metal contained in an ore is sometime found in its elemental form, as in the case of gold or platinum, but more frequently as a sulphur compound, or as an oxide carbonate or silicate. Often several different forms of one metallic element are found in the same deposit and several metals are often found together. Quartz, feldspar, hornblende, fluorite are the common gangue materials, and are sometimes so evenly mixed with the minerals that the ore must be crushed and metal picked out by magnets or separated by specific gravity devices. In other cases the gangue is in such a form that it can be avoided in mining. Some deposits were formed at the same time as the rocks by which they are contained, but in the greater number of cases, the mineral was deposited after the rocks were formed. The greater number of ore deposits are in igneous rocks and not infrequently near hot springs. It is believed that ground water, frequently hot, and sometimes under high pressure because of its depth and in vapor form carried many of the metallic elements in solution until a decrease in temperature or pressure caused the precipitation of the metallic salts they had been carrying in solution.

When metal bearing salts are deposited along a crevice or fissure in tubular form, the deposit is called a vein; and when the veins are parallel and closely spaced, they are known as a lode. A large pocket rich in ore is known as a bonanza. When the metal is found in the open mixed with gravel, as is frequently the case with gold and platinum, they are called placer deposits.

The form of the deposit, the mineral contents or the origin of the ore body are the three most widely used methods of classifying ore bodies. The former is used by miners and the latter by geologists and mining engineers. The five main divisions under this method of classification are:

1. Igneous, those which were formed with the rocks;
2. Pneumatolytic Deposits, made by gases above the critical point;
3. Fumarole Deposits, made by lava;
4. Gas Aqueous Deposits, made by ground water at high temperature;
5. Deposits by ordinary ground or surface water.

Ore deposits are found over a wide range of territory. They are found where there has been igneous activity, or where they have resulted from the work of meteoric waters.

Copper is found in the United States in Michigan, Arizona, Utah and Montana; zinc in New Jersey, and both lead and zinc are found in Missouri, Illinois, Iowa and Wisconsin; iron ore is found around Lake Superior and in parts of the Appalachian region, and gold and silver are found in Alaska, the Black Hills, and in the Cordilleran region.

OREGON, a State in the Pacific Division of the North American Union; bounded by Washington, Idaho, Nevada, California, and the Pacific Ocean; admitted to the Union, Feb. 14, 1859; capital, Salem; counties, 36; area, 96,699 square miles; pop. (1890) 313,767; (1900) 413,536; (1910) 672,765; (1920) 783,389.

Topography.—The surface of the State is mountainous, three ranges dividing it from N. to S.; the Coast Range from 10 to 30 miles from the ocean; the Cascade Mountains, from 110 to 150 miles inland; and the Blue Mountains in the E. The Coast Range has an extreme altitude of 4,000 feet, and is covered with dense forests. The Cascade Mountains, a continuation of the Sierra Nevadas, have an extreme height of 7,000 feet, with several peaks rising 2,000 to 5,000 feet higher. Mount Hood reaches an altitude of 11,500 feet, McLoughlin, 11,000 feet; and Jefferson, 10,500 feet. The Cascades are heavily timbered to the snow line. Four transverse ranges connect the Coast Range with the Cascades; the Calpooia, Umpqua, Rouge River and Siskiyou Mountains. The Willamette river valley, lying between the Coast Range and Cascade Mountains, and the Columbia river and California spur, is 150 miles long, from 30 to 70 miles wide, and is extremely fertile. Eastern Oregon, embracing two-thirds of the State, is a high table-land, with little rain-

fall, and sparsely populated. There are fertile valleys along the rivers and lakes in the S., and in the Blue Mountains. The rivers flowing into the ocean are the Roque, Coquille, Umpqua, Sinslaw, Alsace, Yaquina, Nestuca, and Nehalem; those emptying into the Columbia, Lewis and Clark, Clatskaine, Youngs, Sandy, Willamette, Des Chutes, Hood, Umatilla, and John Day; and those feeding the Snake river, the Owybee, Malbeur, Burnt, Powder, and Grande Ronde. The principal lakes are, Klamath, Goose, Warner, Salt, Christmas, Albery, Summer, Silver, Henry, and Malheur. Crater Lake in the Cascades, 8,000 feet above sea-level, is the crater of an extinct volcano, 10 miles in circumference, and surrounded by bluffs 2,000 feet high. It is the deepest body of fresh water in America. The coast line of Oregon is very abrupt and rocky and but little indented, the mouth of the Columbia river being the best harbor. There are other harbors at Port Orchard, Roque river, Coos Bay, Tillamook Bay, and Yaquina Bay.

Geology.—The geological structure of the State is quite varied. The Coast Range and Blue Mountains are of Eozoic formation; the Cascade ranges and the E. part of the State, of volcanic, with its ridges and hills of obsidian; and the Pacific Coast, Willamette valley, and part of the Umpqua valley, are of Tertiary formation. The Cretaceous fossil deposits are found in the upper valleys of Des Chutes, Crooked and John Day rivers, and the Grande Ronde valley. The Glacial, Champlain, and Terrace periods are well represented. In 1919 the principal mineral productions included gold, silver and coal. The gold production was valued at $1,071,000. The building stones are granite, sandstone, and limestone.

Soil and Agriculture.—The soil is of volcanic origin, with alluvial deposits in the valleys, and is extremely fertile. In the central and S. E. portions of the State the rainfall is very light and the farming depends largely upon irrigation. Grapes, prunes and other fruits thrive abundantly, and the wool growing industry is very large. The acreage, production and value of the principal crops in 1919 were as follows: corn, 71,000 acres, production 1,860,000 bushels, value $2,883,000; oats, 347,000 acres, production 11,104,000 bushels, value $10,216,000; barley, 82,000 acres, production 1,886,000 bushels, value $2,829,000; wheat, 1,126,000 acres, production 20,495,000 bushels, value $43,449,000; hay, 854,000 acres, production 1,452,000 tons, value $27,733,000; potatoes, 45,000 acres, production 4,230,000 bushels, value $6,345,000.

Manufactures.—There were in 1914 2,320 manufacturing establishments, employing 28,829 wage earners. The capital invested amounted to $139,500,000, and the wages paid to $20,921,000. The value of the materials used was $63,258,000, and the value of the finished production was $109,762,000. The natural advantages of the State are extensive, furnishing material for its various manufacturing enterprises, and its streams furnish abundant power at the Dalles, the Cascades, and Oregon City. The principal industries include railroad cars and shop construction, fish canning, flouring mills, lumber and timber, printing and publishing, shipbuilding, slaughtering, meat packing, and the manufacture of woolen goods.

Banking.—On Oct. 31, 1919, there were reported 87 National banks in operation, having $10,661,000 capital, $6,371,000 in outstanding circulation, and $25,793,000 in United States bonds. There were also 171 State banks, with $8,155,000 capital, and $2,980,000 surplus. The exchanges at the United States Clearing House at Seattle, during the year ending Sept. 30, 1919, amounted to $2,013,736,000, an increase over those of the preceding year of $11,686,829.

Education.—The school population in 1918 was 207,158, with a total enrollment of 106,546. The average daily attendance was 111,832. There were in the elementary schools 5,913 teachers. The total expenditures for public education is about $10,000,000 annually. The colleges include the University of Oregon, at Eugene; Pacific University at Forest Grove; Willamette University, at Salem; and Portland University at University Park.

Churches.—The strongest denominations in the State are the Roman Catholic; Methodist Episcopal; Regular Baptist; Disciples of Christ; Presbyterian; Congregational; Methodist Episcopal, South; Protestant Episcopal; and United Brethren

Finances.—The receipts for the fiscal year 1919 was $17,784,693; and the disbursements $17,604,604. The balance on Jan. 1, 1919 was $3,128,790, and on Dec. 31, 1919, $3,308,879. The State indebtedness amounted to $10,665,750. The assessed value of taxable property was $990,435,472.

Railways.—The total length of main line track in 1919 was 2,937 miles. The roads having the longest mileage were the Oregon and Washington Railroad and Navigation Company, and the Oregon and California.

State Government.—The governor is elected for a term of four years. Legislative sessions are held biennially, and are limited to 40 days each. The Legislature has 30 members in the Senate, and 60 in the House. There are 3 Representatives in Congress.

History.—The name Oregon was long applied to all the territory claimed by the United States on the Pacific coast, extending from lat. 42° to 54° 40′ N. By the treaty of 1846, a boundary line was fixed between Great Britain and the United States at lat. 49°. The discovery of the Columbia river, in 1792, was succeeded by an exploration under Captains Lewis and Clark, 1804-1805. In 1808 the Missouri Fur Company established trading-posts in the country; and, in 1811, the American Fur Company founded a settlement at the mouth of the Columbia, and named it Astoria. In 1839, the emigration of Americans commenced overland by way of the South Pass, and the territory continued to receive settlers yearly till 1848, when the California "gold-fever" attracted a large quota of her citizens away. In 1850, however, the land-donation law, passed by Congress, had the effect of registering 8,000 citizens in Oregon, which was formally organized as a Territory, Aug. 14, 1848. On March 2, 1853, Washington Territory was formed out of the N. half of Oregon; Nov. 5, 1857, a State constitution was adopted; and Feb. 14, 1859, the State was admitted into the Union by Act of Congress under the constitution previously ratified. From 1845 till 1855, a desultory warfare was kept up with the Indian aborigines, and a resumption of the same occurred in 1858, and again in 1872–1873.

OREGON AGRICULTURAL COLLEGE. An institution supported by the state, situated at Corvallis, Ore. It was founded in 1885 and now includes fifteen large buildings and has an enrollment in all courses of 4,158. Instruction is given in forestry, agriculture, engineering, mining, commerce, and home economics. Like other western state universities its income is largely derived from the proceeds of the sale of lands ceded to it by the State. This source of income plus the State appropriation yields about $800,000 annually. The college possesses a library of about 30,000 volumes.

OREGON, UNIVERSITY OF, a coeducational non-sectarian institution in Eugene, Ore.; founded in 1872; reported at the close of 1919: Professors and instructors, 118; students, 1,960; president, P. L. Campbell.

O'REILLY, CHARLES J., an American bishop born in St. John, New Brunswick, in 1860. He was educated at St. Joseph's College and at the Grand Seminary, Montreal. He was ordained priest of the Roman Catholic Church in 1890 and for several years was in charge of missions at Oswego. He served as rector in Portland, Ore., in 1894 to 1903. In the latter year he was consecrated first bishop of Baker City. He was for several years editor of the "Catholic Sentinel."

O'REILLY, JAMES, an American Roman Catholic bishop, born in Ireland in 1856. Educated in All Hallows College in Ireland and was ordained priest and served as pastor in Stillwater and Lake City, Minn., and in Padua, Minn. In 1909 he was consecrated bishop of Fargo.

O'REILLY, JOHN BOYLE, an Irish American poet; born at Dowth Castle, County Meath, Ireland, June 28, 1844; became a reporter for English and Irish papers, and Fenianism. In 1863 he enlisted in the 10th Hussars, in Ireland, for the avowed purpose of spreading revolutionary doctrines among the soldiers. For this he was arrested, tried for treason and sent for 20 years penal servitude in Australia. The following year (1869) he escaped to America. In Boston he found work on "The Pilot" (subsequently became editor and principal owner). In 1870 he went to Canada for "The Pilot" during the second Fenian raid and commanded Irish forces. His works include: "Songs of the Southern Seas" (1873); "Songs, Legends and Ballads" (1878); "Moondyne, a Novel" (1879); "Statues in the Block" (1881); "In Bohemia" (1886); and "Stories and Sketches" (1888). He died in Hull, Mass., Aug. 10, 1890.

O'REILLY, PETER J., an American Roman Catholic bishop, born in Dublin, Ireland, in 1853. He was educated in Ireland and was ordained priest in 1877. In the same year he came to America. In 1901 he was consecrated Bishop of Lebedos, Diocese of Peoria.

OREL, a government of Russia, containing 12 districts. It has an area of 18,042 square miles. In the eastern part there is a large area of agricultural land. In the west the soil is sandy and ill adapted for agriculture. Stock raising is the most important industry. There are immense forests which produce timber, tar, and pitch. There are manufactories of iron rails, glass, flour, and hemp products. Pop. about 900,000. Capital Orel.

OREL, the capital of the province of the same name in Russia. It is on Oka river, about 240 miles S. of Moscow. There are several schools and a theological seminary. It is the seat of a bishop and contains several cathedrals. The chief manufactories are candles, oil, and flour. The city was founded in 1564. Pop. about 100,000.

O'RELL, MAX. See BLOUET, PAUL.

ORENBURG, a town of European Russia (Tartar-Bashkir Republic) on the Ural river; 727 miles E. S. E. of Moscow. Founded (1743) as a frontier fortress, it is now of importance for its commerce only; it imports cotton, silk stuffs, cattle, hides, etc., from Bokhara, Khiva, and Tashkend. Corn, metals, sugar, woven goods are the principal exports. The town possesses an arsenal and two military schools. Pop. about 150,000.

ORESTES, in Greek mythology, the son of Agamemnon and of Clytemnestra, the avenger of his father, by becoming the murderer of his mother. For this murder he is relentlessly pursued by the Eumenides or Furies, and only succeeds in appeasing these terrible goddesses by carrying out the instructions of the Delphian oracle to bring back the statue of Diana from Tauris to Argos. Married to Hermione, daughter of Menelaus, Orestes ruled over his paternal kingdom of Mycenæ, and over Argos, upon the death of its king. Orestes is an important figure in the "Choephori" and the "Eumenides" of Æschylus, the "Electra" of Sophocles, and the "Orestes" and "Iphigenia in Tauris" of Euripides.

Scenes from the story of Orestes appear in Greek decorative art.

ORFAH, OORFA, or URFA (ancient Edessa) a fortified town of Asiatic Turkey, 78 miles S. W. of Diarbekr. It is well built, and has a considerable trade with North Syria and Mesopotamia. It is supposed to be the site of the "Ur of the Chaldees," mentioned in Scripture. Pop. about 30,000, mostly Mohammedans.

ORGAN, in anatomy, a member of an organized being through which its functions are executed. Thus the root, stem, and leaves of a plant are organs.

In music, the most comprehensive and important of all wind instruments. Its history can be traced back to the earliest antiquity. Starting from a small collection of pipes, perhaps even from a syrinx, it has gradually grown in size and complexity till, at the present day, one performer has complete control over many thousands of pipes. In its rudimentary state, the wind was admitted to each pipe at the will of the player by means of a sliding strip of wood, which could be pulled in and out; this mechanism was the ancestor of our modern keyboard. The next step was to have more than one series of pipes; strips of wood passing lengthwise under the mouths of each set enabled the player, by pulling a stop, to exercise a choice as to which he used. Afterward, as larger organs were constructed, the smaller were called "portative," because they could be carried about in processions, etc., and the large ones were called "positive," because they were fixtures. The essential principles of the construction of an organ were thus discovered, and it only remained to expand the instruments. In modern instruments, four, or sometimes even five, rows of keys are found, each representing a distinct instrument; these are named after their use or characteristics; as, great organ, that used for grand effects, the principal manual; choir organ, that used for the accompaniment of voices; solo organ, that containing stops for solo use; swell organ, pipes placed in a distant box, with shutters opening and closing like Venetian blinds, by means of which a *crescendo* can be made; pedal organ, the pipes controlled by the pedals. Pipes range from 32 feet to ¾ of an inch in length; they are divided into two great classes, flue and reed, names which need no explanation. The title of stops generally intimates their quality of tone, *e. g.*, flute, violin, oboe, clarinet, trumpet, etc.

In comparative anatomy and physiology, organ of Bojanus, a double organ with two bilaterally symmetrical halves, one on each side of the body, just below the pericardium. This organ performs the function of a kidney.

ORGANIC CHEMISTRY, the chemistry of the carbon compounds in which the hydrogen or nitrogen of the substance is directly united with carbon.

ORGANIC RADICAL, a group of atoms containing one or more atoms of carbon, of which one or more bonds are unsatisfied.

ORGANOTHERAPY. The branch of medical science using animal organs and their extracts for healing purposes. The use of animal tissues as medicines is as old almost as authentic history, and the belief in their efficacy prevailed among almost all races, though their early use was largely superstitious. But modern organotherapy may be said to have begun in the middle of the last century with the discovery of Brown-Sequard

that the glands of the body furnish the blood with useful principles. From that time almost every gland and tissue in the body has been investigated, and in recent years the grafting of glands from animals into the human body has been accompanied by enthusiastic claims. While progress in the study has added substances of value to our therapeutic resources—thyroid extract and adrenaline, for example—the differences and antagonisms between animal and human tissues, and similar elusive principles have kept organotherapy still in the experimental stage.

ORGANZINE, a silk thread of several singles twisted together; thrown silk.

ORIEL, or **ORIOL**, a projecting window, mostly of a triagonal or pentagonal form, and divided by mullions and transoms into different bays and other proportions.

ORIENTAL SOCIETY, AMERICAN. A learned society formed in 1842 for the purpose of promoting Oriental research in America. The society is chartered under the laws of Massachusetts and its constitution provides that one meeting in every three years must be held within the confines of that state. The meetings are held annually and are featured by discussions on Oriental history and philology. The "Journal" published by the Society contains much valuable material for the student of the Orient. The library of the society is at Yale University. Some of the leading educators of America have been presidents of this society, among them being Theodore Dwight Woolsey, W. D. Whitney, President Hadley of Yale University, Daniel Coit Gilman, and Crawford H. Toy. In 1920 the enrollment of the society numbered about 350 members.

ORIENTATION, in anthropology, practices concerning the posture of the dead in their graves, and the living in their temples. In architecture, the placing or building of a church so that its chancel is toward the E., or that part of the E. in which the sun rises on the day of the patron saint. In biology, a term applied to the means by which animals, when taken from home, are able to trace their way back. In surveying, the act of determining the direction of the side of a triangle, or the direction of a chain of triangles.

ORIENTE, a province of Cuba. It has an area of 15,227 square miles. Pop. about 625,000.

ORIFLAMME, or **ORIFLAMB**, the ancient royal banner of France; originally the banner of the abbey of St. Denis, near Paris, which received many important grants from the early French kings. Its color was purple with a tinge of azure, and gold. It became the banner of the monarchy in the reign of Philip I.

ORIGEN, a father of the Church, and one of the most learned ecclesiastical writers; was born in Alexandria, 185 A. D., of Christian parents, who instructed him in religious knowledge and in the sciences. He became catechist, or head of the Christian school of Alexandria. From Alexandria he went to Rome, where he began his famous "Hexapla," an edition of the Hebrew Bible with five Greek versions of it. He returned to Alexandria, and was ordained. Soon after this, he began his "Commentaries on the Scriptures." His great talents and popularity exposed him to the jealousy of the bishop, whose persecutions at length drove him from his native country, and made him a wanderer. Origen is supposed to have died in Tyre about the year 254.

ORIHUELA, a city of Spain in the province of Alicante. It is on the Segura River. The city contains a cathedral and a bishop's palace. It is the center of an important agricultural region. There are also manufactories of silk, linen goods, hats, flour, and oil. Pop. about 35,000.

ORILLON, a curved projection formed by the face of a bastion overlapping the end of the flank, intended to protect it from oblique fire. Also an earthen mound faced with brick.

ORINOCO, one of the great rivers of South America, has its origin on the slopes of the Sierra Parima, in the extreme S. E. of Venezuela; its exact sources were only discovered in 1886 by Chaffanjon. It flows at first W. by N., a mountain-stream, as far as lon. 67° W. A little below Esmeralda (lon. 65° 50′ W.) it divides and sends off to the S. an arm, the Cassiquiare, which, after a course of 180 miles, enters the Rio Negro, a tributary of the Amazon. The other branch on reaching San Fernando (lon. 68° 10′ and lat. 4° 2′ N.) is met by the strong current of the Guaviare; the united stream then turns due N., and after passing over the magnificent cataracts of Maypures and Atures and picking up the Meta on the left, meets the Apure. Below the confluence with the Apure the Orinoco turns E. and traverses the llanos of Venezuela, its waters, with an average breadth of 4 miles, being augmented from the right by the Caura

and the Caroni. About 120 miles from the Atlantic, into which it rolls its milk-white flood, its delta (8,500 square miles) begins. Of the numerous mouths which reach the ocean over 165 miles of coast line only seven are navigable. The waterway principally used by ocean-going vessels, which penetrate up to Ciudad Bolivar (Angostura), a distance of 245 miles, is the Boca de Navios, varying in width from 3¾ to 23 miles. The total length of the river is some 1,550 miles, of which 900, up to the cataracts of Atures, are navigable, besides a farther stretch of 500 miles above the cataracts of Maypures; area of drainage basin, 368,600 square miles.

ORIOLE, *Oriolus galbula*, the type-species of the family *Oriolidæ*. Its conspicuous plumage, bright yellow contrasted with black, chiefly on wings and tail, often brings about its death. The nest is suspended under the horizontal

EUROPEAN ORIOLE

fork of a bough; the eggs are of a shining white, sometimes tinged with pink, and sparsely dotted with purple. It is well known in Europe. Its range in summer is as far E. as Irkutsk, in winter it is found in Natal and Damaraland. In India it is replaced by *Oriolus kundoo*.

ORION, in mythology, a celebrated Greek giant and hero, and the reputed son of Hyrieus of Hyria, in Bœotia. So immense was his size, that when he waded through the deepest seas he was still a head and shoulders above the water; and when he walked on dry land, his stature reached the clouds. After his death he was placed with his hound in heaven, where, to this day, the following constellation bears his name.

In astronomy, one of the ancient constellations found by Ptolemy. The equinoctial passes nearly through its center, and it is situated in the Southern Hemisphere with respect to the equator. Four of the seven stars constituting the constellation are situated in the middle of it, in a straight line. Two of these are of the first magnitude, namely Betelguese or Beltegeux, in the right shoulder, and Rigel in the left foot. In the middle of the square are three stars of the second magnitude, which form what is called the belt of Orion. The constellations which surround Orion are Eridamus, Canis Major, Gemini, Auriga, and Taurus. Near the sword-scabbard is a remarkable nebula, and within the constellation are thousands of small stars, which are only visible by powerful telescopes.

ORISSA, a maritime province, of Hindustan; on the Bay of Bengal; constituted by the British in 1912 out of the state of Bengal, area, 13,743 square miles, pop. about 5,210,000 and the native states of Bihur and Orissa, area, 28,648 miles. Pop. about 5,200,000. The surface along the shore is in general low and sandy, and in the interior wild and rugged. The inhabitants are composed chiefly of Oorias, the conquerors of the country, and of wild hill tribes. The largest river is the Mahánadi. The chief towns are Cattack, Puri or Juggernauth, and Balasore.

ORIZABA, city of the Mexican state of Vera Cruz; 82 miles W. S. W. of Vera Cruz city, and 181 E. S. E. of Mexico; in a fertile garden country, 4,030 feet above the sea; contains an extensive cotton factory, paper and corn mills, and railway shops. The volcano of Orizaba, 25 miles N., is a noble pyramid rising to an elevation of 17,876 feet, or, according to Heilprin's measurements, 18,205 feet. Its last severe eruption was in 1566. Pop. about 40,000.

ORKNEY ISLANDS, a group of 90 Scotch islands, islets, and skerries, of which only 28 are inhabited, and which have an aggregate area of 376 square miles, the largest being Pomona or Mainland (207 square miles), Hoy (53), Sanday (26), Westray, South Ronaldshay, Rousay, Stronsay, Eday, Shapinshay, Burray, Flotta, etc. They extend 50 miles N. E., and are separated from Caithness by the Pentland Firth, 6½ miles wide at the narrowest. With the exception of Hoy, which has fine cliffs, and in the Ward Hill attains 1,564 feet, the scenery is generally tame, the surface low and treeless, with many fresh

water lochs, and the soil shallow, incumbent on peat or moss. The mean annual temperature is 45°, the rainfall 34.3 inches. The area under cultivation has more than doubled since 1850, but is still less than one-half of the total area. The live stock during the same period has trebled; agriculture and fishing are the principal industries. The Orkneys (Ptolemy's Orcades) were gradually wrested by Norse rovers from their Pictish inhabitants. They continued subject to the Scandinavian crown—till 1231, and afterward under the Earls of Angus and Stratherne and the Sinclairs —till in 1468 they were given to James III. of Scotland as a security for the dowry of his wife, Margaret of Denmark. The present landed proprietors are chiefly of Scotch descent, the islanders generally of mixed Scandinavian and Scotch origin. Pop. (1918) estimated, 23,100. In the World War (1914-1918) the British Grand Fleet made Scapa Flow in the Orkneys its base for naval operations. Here the surrendered German war-ships were interned and subsequently sunk by order of the German Naval Command.

ORLANDO, a city of Florida, the county-seat of Orange co. It is a popular winter resort and is noted for its hunting and fishing. It is the center of an important fruit-growing region. Pop. (1910) 3,894; (1920) 9,282.

ORLÉANS (or-lā-an'), a city of France, capital of the department of the Loiret; on the Loire; 68 miles S. W. of Paris. It has some handsome public squares, a Gothic cathedral, and other notable buildings. Confectionery, pottery, and woolen goods are the staple articles of manufacture. Philip of Valois erected Orléans into a duchy and peerage in favor of his son, and Orleans continued to give the title of duke to a prince of the blood royal. In 1426 the city sustained a siege against the English, and was relieved by the Maid of Orléans (Joan of Arc), whose statue in bronze stands in one of the public squares. It was taken and retaken more than once in the Franco-German War in the latter part of 1870. Pop. about 75,000.

ORLEANS, a French royal family, two houses of which have occupied the throne of France. Henry III. (died 1589) was the last sovereign of this house, the Valois-Orléans branch. The house of Bourbon-Orleans is descended from Philip, Duke of Orleans, son of Louis XIII. and younger brother of Louis XIV. His son Philip, Duke of Orleans, was regent of France during the minority of Louis XV. His grandson, Louis Philippe Joseph, who assumed the surname of Egalité, was beheaded in 1793. Louis Philippe, Duke of Chartres, afterward King of the French, was the son of Egalité. The grandson of Louis Philippe, the Comte de Paris, born 1838, and educated in England, next became the head of the royal house and royalist party of France. He died in England, Sept. 8, 1894; and the title passed to his son, Louis Philippe Robert, born in Twickenham, England, Feb. 6, 1869, and not permitted in France.

ORLEANS, BASTARD OF. See DUNOIS, JEAN.

ORLEANS, JEAN BAPTISTE GASTON, DUKE OF, third son of Henry IV. of France, and Mary Medici; born April 25, 1608. By his first marriage, with Mary of Bourbon, heiress of the house of Montpensier, he had a daughter, author of some interesting memoirs. During the disturbances of the Fronde he joined De Retz, the soul of the Fronde, who, however, soon saw through the character of his fickle and feeble confederate. After the termination of the troubles (1648) the duke was banished to Blois. He died Feb. 2, 1660.

ORLEANS, LOUIS ALBERT PHILIPPE, Count of Paris; born in the Tuileries, Paris, France, Aug. 24, 1838; son of the Duke of Orleans; was educated at Claremont, England. In 1861 he and his brother, the Duke of Chartres, came to the United States and served with distinction on General McClellan's staff till June, 1862. After the establishment of the republic in France he lived in Paris, till the expulsion bill of 1886 drove him into exile to England. Among his publications, his "History of the Civil War in America" (1874–1889) is highly esteemed by historians and military critics. He died in London, England, Sept. 8, 1894.

ORLEANS, LOUIS PHILIPPE JOSEPH, DUKE OF (Egalité), a great-grandson of the regent Philippe, Duke of Orleans; born in St. Cloud, France, April 13, 1747; married in 1769 the daughter of the Duke of Penthièvre. He was notorious for his dissoluteness of manners. His opposition to the court began in 1771, and he became the rallying point of its enemies. In 1787 he was exiled for the part he took in the Assembly of Notables; in 1789 he was one of the nobles who joined the Tiers Etat (Third Estate); in 1792 he went over to the revolutionary party without reserve, took the name of Philippe Egalité

("Philip Equality"), and voted for the death of Louis XVI. It did not save him from being arrested as a Bourbon, condemned and beheaded, in Paris, Nov. 6, 1793.

ORLEANS, LOUIS PHILIPPE ROBERT, DUKE OF, born in Twickenham, England, Feb. 6, 1869; son of the Count of Paris, and heir to the French throne; was educated in France, but banished with the other princes in 1886. In 1890 he returned and demanded the right of enlisting in the army, but was again imprisoned and banished. On the death of his father, in 1894, he became the head of the royal house.

ORLEANS, PHILIPPE, DUKE OF, only brother of Louis XIV. of France, and founder of the house of Bourbon-Orléans, which for a short time held the throne of France; born Sept. 21, 1640. In his 21st year he married Henrietta of England, sister of Charles II. The great esteem which the king showed for this princess excited the jealousy of his brother, and her sudden death was attributed to poison, to the administration of which the duke was suspected of being accessory. His jealousy seems not to have been unfounded. The second marriage of the duke, with the Princess Elizabeth of the Palatinate (1671), was arranged by Louis to secure the neutrality of the Elector Palatine in the approaching war against Holland. In this war the duke distinguished himself in spite of his effeminacy. He died June 9, 1701.

ORLEANS, PHILIPPE, DUKE OF, Regent of France, son of Philippe, Duke of Orleans, and the Princess Palatine Elizabeth; born in St. Cloud, France, in August, 1674. He fell early under the influence of the clever and unscrupulous Abbé (afterward Cardinal) Dubois. He made his military debut at the siege of Mons (1691), and in 1693 distinguished himself at Neerwinden, but only to arouse the jealousy of Louis XIV., his uncle, who compelled him to retire from the army. In 1692 he married Mlle. de Blois, the legitimated daughter of Louis. In 1707 he was appointed to succeed the Duke of Berwick in Spain, and completed the subjugation of that country. He was recalled, however, being suspected of intriguing for the crown of Spain. On the death of the king (Sept. 1, 1715), he was appointed regent. He found the finances in extreme disorder, and his reckless introduction of a vast paper currency brought the nation to the verge of bankruptcy. He resigned the government to Louis XV. on Feb. 13, 1723, and died in Paris, in December of the same year.

ORLOFF, a celebrated Russian family, founded under Peter the Great by Ivan Orel, one of the archers or *strelitzes*, who, when that body was destroyed, saved his life by his cool courage, and became an officer and a noble. The most celebrated of his descendants were: GREGORY, a Russian general and political intriguer, who greatly promoted the elevation of his mistress, Catherine II., to the throne. Being disappointed in his hope of sharing the crown with her, and declining a private marriage, he was supplanted by a new favorite, and died insane in 1783. He had one son by the empress, named Bobrinski. ALEXIS, his brother, and fellow conspirator, was a man of gigantic stature and strength, and is said to have strangled the Emperor Peter with his own hands. He was a favorite of Catherine, and was married to the Princess Tarakanoff, daughter of the Empress Elizabeth; died in 1808. GREGORY VLADIMIROWITZ, a nobleman of the same family, born in 1778, and bearing the title of Count Orloff, was distinguished for his patronage and culture of letters. He was author of "Historical, Political, and Literary Memoirs of Naples"; and "History of the Arts in Italy"; died in 1826. MICHAEL, son of the above Alexis; born in 1785, served in the Russian army against Napoleon I., and went to Paris with the Allies in 1814. ALEXIS, brother of the preceding; born in 1787, distinguished himself as a diplomatist and statesman under Nicholas, and died in 1861.

ORMOLU, a brass used for cheap jewelry, and composed of zinc and copper, in various proportions, to imitate gold. Gold lacquer is used to heighten the color. It is also called mosaic gold. Bronze and copper-gilt also go by this name.

ORMONDE, JAMES BUTLER, DUKE OF, an English statesman; born in London, England, Oct. 19, 1610. He was the first of the ancient Anglo-Irish family of Butler on whom the ducal title was conferred. In the beginning of the 13th century Theobald Butler, from whom the Duke of Ormonde was descended, held the hereditary office of royal cupbearer or "butler" of Ireland. The duke's father, the son of the celebrated Walter, Earl of Ormonde, was drowned in crossing the channel; and the old earl having incurred the displeasure of the king, James I., and being thrown into prison, James, who on his father's death became, as Viscount Thurles, the heir

of the title, was taken possession of as a royal ward, and placed under the guardianship of the Archbishop of Canterbury. On the restoration of his grandfather to liberty, he also was released; and in his 20th year he married his cousin, Lady Elizabeth Preston, and in 1632 succeeded, upon his grandfather's death, to the earldom and estates of Ormonde. During the Strafford administration in Ireland Ormonde distinguished himself. He failed to please in 1643 when he concluded an armistice; his policy was condemned as well by the friends as by the enemies of the royalist party in England. During the long contest of Charles with the Parliament, Ormonde continued to uphold the royal interest in his Irish government; and when the last crisis of the king's fortunes came, he resigned his Irish command, and retired to France, from which country he again returned to Ireland with the design of restoring the royal authority. After a gallant but unequal struggle, he was, however, compelled, in 1650, to return to France. At the Restoration he accompanied Charles II. on his return, and was rewarded for his fidelity by the ducal title of Ormonde. His after life was less eventful, though he twice again returned to the government of Ireland. It was in 1679 as he was returning from a civic festival, he was attacked by Colonel Blood and a party of ruffians, and dragged from his coach with the intention of being hanged at Tyburn. He escaped uninjured, and lived till the year 1688. He died in Dorsetshire, England, July 21, 1688.

ORMONDE, JAMES BUTLER, 2D DUKE OF, an English military officer; born in Dublin in 1665. In 1682 he married Anne, daughter of Lord Hyde, afterward Earl of Rochester. As Earl of Ossory he served in the army against Monmouth, and also held an office in the palace under James II. After his accession to the dukedom by the death of his grandfather in 1688, he took his share in the Revolution conflict, but afterward, at the coronation of William and Mary, he acted as lord high-constable. He was present at the battle of the Boyne, at the head of William's life guards. He soon became popular. In 1702 he was placed in command in the expedition against Cadiz; in 1703 he was appointed lord-lieutenant of Ireland, and in 1711 Commander-in-Chief of the land forces sent against France and Spain. After the accession of George I. Ormonde somehow fell into disgrace with the king, and was impeached in 1715 of high treason, and with the result that his estates were attainted, and he was deprived of all his honors. He retired into France, where he attached himself to the Jacobite court, and spent many years in the secret intrigues of the Pretender and his followers. A collection of letters written by him in the organization of the abortive attempt by Spain to invade England and Scotland in 1719, were in 1890 brought to light, and in 1896 issued by the Scottish History society. He died abroad in 1745.

ORMULUM, a Transition English metrical translation of the Gospel history.

ORMUZ, or HORMUZ, a small town on the island of Jerun, in the Strait of Ormuz, at the entrance of the Persian Gulf, 4 miles S. of the Persian coast. Three centuries before the Christian era there existed on the mainland, 12 miles E. of the island, a city Ormuz; this in the 13th century was the headquarters of the Persian trade with India. But about the end of the century its ruler transferred his people to the site of the present town, to escape the Mongols. The new city maintained its commercial supremacy even after it passed into the hands of the Portuguese, through Albuquerque's capture of it in 1507. It was taken from the Portuguese in 1622 by an English fleet (Baffin, the Arctic navigator, being killed in the action), and given to Shah Abbas of Persia, who transferred the trade to his port of Bandar Abbas, 12 miles N. W. on the mainland. The Portuguese fort still stands, but the town of Ormuz is a ruin. The island yields salt and sulphur.

ORMUZD, in Persian mythology, the beneficient deity of the Zoroastrian religion as it is set forth in the Zendavesta. According to this system (dualism), Ormuzd, the principle of light and purity, created six immortal spirits, then 28 subordinate spirits, and lastly the souls of men, while Ahriman, the opposing evil principle, produced six evil angels with sundry subordinate principles, leading, however, to the triumph of Ormuzd, when Ahriman will acknowledge his supremacy, and all creatures shall be delivered from the dominion of evil.

ORNDORFF, WILLIAM RIDGELY, an American chemist, born in Baltimore, in 1862. After studying at Baltimore City College and at Johns Hopkins University, and at several other universities in Germany, he was instructor and assistant professor of chemistry at Cornell University, from 1887 to 1898. He was professor of organic chemistry from 1902. In 1890 he served as special agent

of the United States Census, and carried on many important researches in chemical subjects, and was a member of many important American and foreign chemistry societies. He wrote "Laboratory Manual of Organic Chemistry" in 1894.

ORNE, a department of France, formed out of the old provinces of Normandy, Alençon, and Perche; separated from the English Channel on the W. by La Manche and on the N. by Calvados; area, 2,371 square miles; pop. about 300,000. A range of wooded hills, nowhere rising above 1,370 feet, extends across the S. of the department from E. to W., separating the streams that flow N. to the English Channel from those that go S. to the Seine and Loire. Though the soil is fertile, agriculture is not in an advanced state. Apple and pear trees abound, and more than 22,000,000 gallons of cider are made every year. Cattle and horses of the purest Norman breed are reared. There are cotton and hemp spinning, and cotton and linen weaving, dyeing, bleaching, and manufacture of gloves, iron, glass, etc. Fishing and bee keeping are carried on. Capital, Alençon.

ORNITHOLOGY, in natural science, the methodical study, and consequent knowledge of birds, with all that relates to them. It embraces caliology (which treats of nests), oölogy, pterylology, and ornithotomy. Its earliest literature dates from Aristotle (384-322 B. C.), and every succeeding age has added its quota.

ORNITHORHYNCHUS, commonly called duckbill or watermole, in zoölogy, the sole genus of the family. Premaxilla and the mandible expanded anteriorly, and supporting a horny beak; teeth supplied functionally by horny structures; legs short, fitted for swimming; feet webbed, each with five well developed toes, armed with large claws, and beyond which, in the forefeet, the interdigital membrane is extended. Tongue not extensile; tail rather short, broad, and depressed; eyes very small; fur close and soft. A single species, *O. paradoxus, O. anatinus*, inhabits Australia and Tasmania. It is aquatic, and feeds on water insects, small mollusca, and worms. The ornithorhynchus, though mammalian in its general structure, is oviparous, laying two eggs at a time. These are about ¾ inches in the longer, and ½ inches in the shorter diameter.

ORONTES, the ancient name of a river in Syria, now called NAHR-EL-ASI. It rises in the highest part of Cœle-Syria, near Baalbek, flows N. between the mountains of Libanus, as far as the city of Antioch, and then W. to the Mediterranean Sea, through a total course of 147 miles.

ORPEN, MAJOR SIR WILLIAM, British painter. He was born in Ireland in 1878, and was educated at the Dublin Metropolitan School of Art and Slade School. He won much prominence as a portrait painter, and in 1918 had a great exhibition of his war pictures, many of which he presented to the government. His painting representing the international delegates at Versailles in 1919 was completed in 1920.

ORPHAN ASYLUM, or **ORPHANAGE**, an establishment in which orphans are provided for and educated. In all well regulated states the duty of taking care of destitute orphans was recognized at an early age, and it appears that the cities of Thebes, Athens, and Rome had establishments in which orphaned, deserted, and illegitimate children were supported and educated at the public expense. In the Middle Ages such asylums were numerous and generally under the direction of the clergy. In recent times public orphanages have been substituted or supplemented by the farming out system, that is, the children are brought up in private families willing to undertake their charge. Orphan asylums, as conducted in the United States, are supported as private institutions, assisted by legislative appropriation. They are fostered also by the religious denominations.

ORPHEUS, in Greek mythology, a celebrated mythic bard, said to have been a son of Apollo or Œagrus, King of Thrace, and the Muse Calliope. Together with his brother Linus he was regarded as having introduced the arts of civilized life among wild and untutored hordes.

ORPIMENT, in mineralogy, an orthorhombic mineral occurring sometimes in crystals, mostly as cleavable masses, earthy, or as incrustations. Composition: Sulphur, 39.0; arsenic, 61.0 = 100. Found in metalliferous veins with realgar at many localities.

ORRERY, in astronomy, a planetary machine to illustrate and explain the motions of the heavenly bodies.

ORRIS ROOT, in botany, the rhizome of *Iris florentina* and *I. germanica*, sometimes called violet-scented orris root.

Orris-root starch, the starch or flour of the root of *I. florentina*, used in the

manufacture of violet powder, and for scenting snuffs.

ORSINI, one of the most illustrious, and powerful families of Italy. It became known about the 11th century, and had already acquired high rank and extensive possessions in the Papal States when one of its members, Giovanni Gætano, was raised to the pontificate under the title of Nicholas III. (1277–1280). The feud between the Orsini and Colonna families is celebrated in history. Many of the Orsini became famous military chiefs. Vincenzo Marco Orsini (Benedict XIII.) succeeded Innocent XIII. as Pope in 1724. The Orsini family is now divided into two branches, the Orsini-Gravina at Rome and the Orsini of Piedmont.

ORSINI, CARDINAL. See BENEDICT XIII.

ORSOVA, the name of two towns on the Danube near the Iron Gates. OLD ORSOVA, a Hungarian place, is 478 miles S. E. of Vienna, and is a station for the Danube steamers. NEW ORSOVA, on the Serbian side, is a fortified town held by Austria (since 1878), who also were masters of it between 1716 and 1738; the Turks held it both before 1716 and after 1738. In 1890–1896 a costly canal and other works were made for facilitating navigation at the rocky bend called the Iron Gates.

ORTEGAL, CAPE, the N. W. point of Spain.

ORTH, SAMUEL PETER, an American educator, born at Capac, Mich., in 1873. Graduated Oberlin College in 1896 and took post graduate courses at the University of Michigan and Columbia University. From 1897 to 1902 he was professor of political and social science of Buchtel College. From 1903 to 1912 he practiced law in Cleveland. In the latter year he became professor of political science in Cornell University, and was lecturer on law and economic subjects in several colleges and universities. He was president of the Board of Education in Cleveland in 1904. He accompanied the Cook Arctic expedition to Greenland in 1894 and wrote "Five American Politicians" (1903); "Socialism and Democracy in Europe" (1913); "Imperial Impulse" (1916).

ORTHEZ, a town in the French department of Basses-Pyrénées, on the bank of the Gave de Pau, 41 miles E. of Bayonne. The "Tower of Moncade" (1240), the stately castle of the counts of Foix, which Froissart visited in 1388, was reduced to a ruin by Richelieu. Near Orthez Wellington gained a decisive victory over Soult, Feb. 27, 1814.

ORTHOCLASE, in mineralogy, a monoclinic species of the felspar group of unisilicates. Dana distinguishes the following varieties: 1. Ordinary, (1) adularia, including moonstone and valencianite; (2) sunstone, or aventurine felspar; (3) necronite; (4) amazon stone, now referred to microcoline; (5) erythrite; (6) sanidine, or glassy felspar; (7) chesterlite, now referred to microcline; (8) microcline of breithaupt; (9) loxoclase; (10) paradoxite; (11) cottaite; (12) muldan; (13) lazurfelspar; (14) perthite; (15) murchisonite. 2. Compact orthoclase or orthoclase-felsite, including massive kinds constituting rocks; it is an essential constituent of many rocks, granites, gneisses, syenites, etc.

ORTHODOX, holding the right or true faith; sound in opinion or doctrine; especially in religious opinions or doctrines; opposed to heterodox and heretical.

ORTHOEPY, the art of uttering words correctly; correct speech or pronunciation.

ORTHOGRAPHY, the art, practice, or habit of spelling words correctly according to the recognized usage; correct or proper spelling; as, the orthography of a word. Also that part of grammar which deals with the nature and properties of letters. In architecture and draughting, the elevation of a building, showing all the parts thereof in their true proportions; the orthography is either external or internal. The external is the delineation of the outer face or front of a building; the internal is a section of the same.

ORTHOPÆDIA, a branch of medical science relating to the cure of natural deformities. Orthopædia is divided into prophylactic or preventive, and therapeutic or curative. The object of the former is to prevent deformities in infants, and is obtained by hygienic means, such as pure air, careful nursing, and suitable food, clothing, and exercise; that of the latter is to correct deformities already existing by mechanical treatment.

ORTHOPTERA, in entomology an order of the class Insecta, having four densely reticulated wings, the anterior more or less coriaceous, the posterior folded under them, and membranous; sometimes apterous. In the most typical groups the wings are deflexed and closely applied to the body. Mouth mandibulate, metamorphosis incomplete.

ORTLER-SPITZE, or **ORTLER**, a mountain of the Alps, in Tyrol, near the borders of Switzerland and Italy, the highest of the Austrian and German Alps; height, 12,814 feet. The group to which this mountain belongs is known as the Ortler Alps.

ORTOLAN, a gardener. In ornithology, *Emberiza hortulana*, a native of continental Europe and Western Asia, migrating S. in winter, though it is unknown whither, returning about the end of April or the end of May. In appearance and habits it much resembles the yellow-hammer, but the head is greenish-gray.

ORTON, EDWARD, JR., an American educator, born in Chester, N. Y. in 1863. He graduated from Ohio State University in 1884 and for four years afterwards served as chemist in a blast furnace. He was the first to begin the manufacture of "ferro-silicon" as an alloy of iron in the United States. Largely through his efforts a school for instruction in the technology of clay, glass and cement industries was established. From 1902 to 1906 he was dean of the College of Engineering at the Ohio State University, serving again in that capacity from 1910 to 1916. He served as major in the Quartermaster Service in 1917. He was a member of many important professional societies. He wrote many reports on clay industries and many technical articles for professional magazines.

ORTYX, in ornithology, a genus of *Perdicinæ;* bill short, very high, the tip hooked; lateral toes, unequal; hinder toe, none, confined to America. *O. virginianus* is the Virginian quail.

ORURO, capital of the department of Oruro, in Bolivia; on a saline plain 11,960 feet above the sea, near the salt lake of Aullagas, and possesses mines of silver, gold, and tin. Founded in 1606, it had 70,000 inhabitants in the 17th century, pop. about 25,000.

ORVIETO, a city of Italy, province of Perugia; 78 miles N. N. W. of Rome; crowns an isolated tufa rock, which rises 765 feet above the river Pagalia, and 1,327 above sea-level. The cruciform cathedral (1290–1580), one of the most beautiful and richly adorned specimens of Italian Gothic, is built of black and white marble, and measures 295 feet by 109. The interior also is magnificently decorated with sculptures and with paintings by Luca Signorelli, Fra Angelico, etc. The bishop's palace and St. Patrick's Well (1527–1540), with its 250 steps, are also noteworthy. Orvieto, called in the 7th century A. D. Urbs Vetus in the Middle Ages gave shelter to 32 Popes. Pop. (1911) with suburbs, about 20,000.

O'RYAN, JOHN F., an American army officer. He was born in New York, 1874, and after attending Catholic public schools, studied at College of the City of New York from 1890 to 1893. In 1898 he graduated as LL.B. from New York University, being in the same year admitted to the bar, becoming member of the firm Corbin &

GENERAL JOHN F. O'RYAN

O'Ryan. In 1897 he enlisted as a private in Company G, 7th Infantry, National Guard, New York and from 1900 commanded as second lieutenant the 2d Battery. He became first lieutenant in 1904, and captain of the 1st Battery in 1907. In 1911 he was promoted Major of the 2d Battalion Field Artillery and in 1912 became Major-General commanding the National Guard of New York. He commanded the New York Division on the Mexican border in 1916 and after the United States had declared war with the Central Powers was in 1917 appointed by President Wilson commander of the 27th Division, National Guard, and later Major-General in Europe. He was through all the campaigns with the National Guard during the World War, and on his return to the United States with his war-tried veterans in 1919 was given a great popular reception.

ORYX, in zoölogy, a genus of *Bovidæ;* according to Sir Victor Brooke, typical of the sub-family *Oryginæ.* Four species are known: *O. leucoryx,* the Leucoryx, from Northeastern and Western Africa; *O. gazella,* the gemsbok, from Southern Africa; *O. beisa,* the beisa antelope, from Eastern Africa, and the coasts of the Red Sea; and *O. beatrix,* from Arabia.

OSAGE ORANGE (*Maclura aurantiaca*), a tree of the natural order *Moraceæ,* a native of North America. It attains a height varying, according to soil and situation, from 20 to 60 feet. It is of the same genus with fustic, and its wood, which is bright yellow, probably might be used for dyeing. The wood is fine grained and very elastic, and takes a high polish; it is much used for fence-posts, sleepers, paving-blocks, etc. The tree is largely employed in the United States, especially in the West, as a hedge plant; it has also been introduced into Great Britain for that purpose. Its fruit, about the size of a large orange, is seldom eaten.

OSAGES, a tribe of North American Indians, about 1,500 in number, living on a reservation in the N. part of the State of Oklahoma. It is said to be the richest community in the world. They own nearly 1,500,000 acres, most of it leased to oil companies.

OSAKA, or **OZAKA**, an important city of Central Japan, at the head of the gulf of the same name. The city covers an area of about 8 square miles and is intersected with canals. Its fine castle, the stones of whose walls are of astonishing size, was constructed by Hideyoshi's orders in 1583, and the palace, built afterward in its precincts and destroyed in 1868, was perhaps the most magnificent structure in Japan. Osaka is the great commercial center of the empire, and the headquarters of the rice and tea trade. Its port does not admit of the entrance of large vessels. There is a foreign settlement, mostly occupied by missionaries. Osaka was ravaged by destructive fires in 1910 and 1912. Pop. about 1,500,000.

OSBORN, CHASE SALMON, an American public official, born in Huntington co., Ind., in 1860. After studying at Purdue University he entered newspaper work at Lafayette, Ind. In several years following he did newspaper work in Chicago and Milwaukee. He became a newspaper publisher in Florence, Wis., and afterwards purchased and published other newspapers in Michigan. He served in various public capacities and was commissioner of railroads from 1899 to 1903. He was elected governor of Michigan in 1911. He wrote "The Andean Land" in 1909.

OSBORN, HENRY FAIRFIELD, an American scientist and author. He was born in 1857 at Fairfield, Conn., and after graduating at Princeton in 1877, devoted himself to the study of palæontology. In 1881 he became instructor at Princeton in natural science and two years later professor of anatomy, leaving in 1890 to teach zoölogy at Columbia University. He was twenty years at Columbia, filling the post of dean of natural science part of the time, and that of curator of vertebrate palæontology in the American Museum of Natural History. While engaged in teaching, his research and exploration work widened the field of natural history and his reconstruction of prehistoric mammals drew the attention of scientists all the world over. In 1908 he became president of the board of trustees of the Natural History Museum, and has acted as palæontologist to the geological surveys of the United States and Canada. He was official or president of several societies working in his field, among them the Bison Society, and the Morphological Society. His first published work, which appeared in 1890, was "Evolution and Heredity." Since then he wrote "From the Greeks to Darwin"; "Hereditary Mechanism"; "Evolution of Mammalian Molar Teeth"; "The Age of Mammals"; "Huxley and Education"; "Men of the Stone Age."

OSBORN, HENRY STAFFORD, an American educator; born in Philadelphia, Pa., Aug. 17, 1823; graduated University of Pennsylvania in 1841, Union Theological Seminary 1846. He held several pastorates and was Professor of Mining and Metallurgy in Lafayette College in 1866–1870; and Miami University till 1873, when he devoted himself to elaborating his surveys of noted places in Biblical history, and preparing a set of maps of the Holy Land that have become standards. Among his publications are: "Palestine, Past and Present" (1855); "Scientific Metallurgy of Iron and Steel in the United States" (1870); "Ancient Egypt in the Light of Recent Discoveries" (1885); "Biblical History and Geography" (1888); etc. He died in New York City, Feb. 2, 1894.

OSBORN, HERBERT, an American biologist, born at Lafayette, Wis., in 1856. He graduated from Iowa State College in 1879. He served as professor of zoölogy at that institution from 1885

to 1898. In the latter year he was appointed state entomologist of Iowa. He was director of the Lake Laboratory of Ohio University in 1898 and was director of Ohio Biological Survey in 1912. He was a member of many important American and foreign professional societies. He wrote much on entomology. His most important works are "Economic Zoölogy" (1908); "Economic Entomology (1916). He also contributed many articles to professional journals.

OSBORN, LAUGHTON, an American artist and author, born in New York City in 1809. He graduated at Columbia College in 1827. His works include: "Sixty Years of Life" (1831); "Vision of Rubeta" (1838); "Arthur Carryl" 1841; "Travels by Sea and Land" (1868). He died in New York City, Dec. 12, 1878.

OSBORNE, THOMAS MOTT. An American penologist and manufacturer, born in 1859, and a graduate of the class of '84 at Harvard. Upon entering business he became president of the Auburn Publishing Company and was associated in an official capacity with many other firms. At his birthplace, Auburn, N. Y. he took an active interest in politics, being mayor of the city from 1903–1905. His interest at this time was aroused by conditions in prisons and he became a member of the National Committee on Prison Reform. In 1913 he had himself committed to the Auburn State Prison the better to study the conditions of the prisoners. From 1914–1916 he was warden of Sing Sing prison, where his humane work attracted national attention.

OSBORNE, WILLIAM HAMILTON, an American lawyer and writer, born at Newark, N. J., in 1873. He was a graduate of the common schools and studied law at the New York Law School. He was admitted to the bar in 1894. He practiced in New York and New Jersey. He wrote "The Red Mouse" (1909); "The Running Fight" (1910); "How to Make Your Will" (1917). He also contributed to many magazines.

OSBORNE SERIES, a series of beds of Oligocene age, found at or near Osborne, in the Isle of Wight. They were deposited in fresh and brackish water. There are, of animals, peculiar species of Paludina, Melania, Melanopsis, and Cypris, and of plants, Chara. One bed is the Nettlestone Grit, near Ryde, which is a freestone much used for building. Called also the St. Helen's series.

OSBOURNE, LLOYD, an American author, born in San Francisco, Cal., 1868; son of Fanny Van de Grift Osbourne, who afterward married Robert Louis Stevenson. Educated in private schools and University of Edinburgh. Was United States vice-consul at Samoa in 1897. Among his best known books are: "The Wrong Box" (with Robert Louis Stevenson) (1889); "The Queen vs. Billy" (1900); "The Motor Maniacs" (1905); "A Person of Some Importance" (1911); and, with Austin Strong wrote "The Exile," which was played by Martin Harvey.

OSCANS, the name of an Italian people who at an early period occupied Campania, and were either closely allied to or the same race as the Ausones. Subsequently (about 423 B. C.) Samnites from the hilly districts to the N. overran the country and amalgamated with the inhabitants whom they had subjugated; and the names Osci and Oscan language were subsequently applied to all the other races and dialects whose origin was nearly or wholly the same. The Oscan language was not substantially different from the Latin, but only a ruder and more primitive form of the same central Italian tongue. By the victories of the Romans over the Samnites, and the conferring of the *civitas* on all the Italians (88 B. C.), an end was put to the official use of the Oscan tongue; nevertheless, in the time of Varro (1st century B. C.) it was still used by the people.

OSCAR I., JOSEPH FRANÇOIS BERNADOTTE, King of Sweden and Norway, son of Bernadotte (Charles XIV.); born in Paris, France, July 4, 1799. In 1823 he married Josephine, eldest daughter of Prince Eugène Beauharnais. During the reign of his father he was three times (in 1824, 1828, and 1833) viceroy of Norway, where he made himself popular by his good administration. He acceded to the throne in 1844. He took little part in foreign politics and resigned in favor of his eldest son in 1857. He died July 8, 1859.

OSCAR II., King of Sweden and Norway; born Jan. 21, 1829, a great-grandson of Napoleon I.'s famous general, Marshal Bernadotte, the first king of the new independent kingdom of Norway. He ascended the throne in 1872, in succession to his brother, Charles XV. He was an excellent scholar and writer, and translated Goethe's "Faust" into Swedish. Issued in 1888 a volume of minor poems under his *nom de plume* of "Oscar Frederik." He married, in 1857, the Princess Sophia of Nassau, by whom he had four sons. Norway withdrew from him in 1905, and he refused a scion of his

house to that throne, therefore she turned to Denmark. He died Dec. 8, 1907.

OSCEOLA, a chief of the Seminole Indians; born in Florida about 1813; was the son of an Indian trader called Powell. In 1835, while on a visit to Fort King, his wife was claimed as a slave, as being the daughter of a fugitive slave woman, and carried off as such. Osceola resolved upon vengeance, and some months afterward, finding General Thompson outside of the fort, killed him and six other whites in his company, Dec. 28, 1835. Such was the beginning of the second Seminole War, during which Osceola defeated the United States troops in several engagements. On Oct. 23, 1837, while holding a conference under a flag of truce with General Jessup, near St. Augustine, he was treacherously seized and kept in confinement in Fort Moultrie till his death, in 1838.

OSCILLATION, the vibration of reciprocal ascent and descent of a pendulous body. The problem of oscillation, in its widest sense, includes most of those which occur in astronomy, optics, etc. To their average motions, the moon and planets add small oscillations about their mean places; the tides consists of oscillations of the ocean, etc. In general language, however, the problem of oscillation refers only to the purely theoretical part of the problem of the pendulum.

O'SHAUGHNESSY, ARTHUR WILLIAM EDGAR, an English poet; born in 1844. In 1864 he entered the British Museum. He was a follower of Morris and Swinburne and of the French romantic school. He published between 1870 and 1881: "An Epic of Women"; "Lays of France," a free paraphrase of the *lais* of Marie de France; "Music and Moonlight"; and "Songs of a Worker." He died in 1881.

O'SHAUGHNESSY, EDITH COUES (MRS. NELSON O'SHAUGHNESSY), an American writer, born in Columbia, S. C. She was educated privately and married Nelson O'Shaughnessy in 1901. She wrote "A Diplomat's Wife in Mexico" (1916); "Diplomatic Days in Mexico" (1917). During the war she was engaged in relief work in France.

O'SHAUGHNESSY, NELSON, an American diplomat, born in New York in 1876. Graduated Georgetown College in 1892, and afterward studied at Oxford University. After making a study of international law and foreign languages in Europe, he returned to the United States. He was appointed secretary of the legation of Copenhagen in 1904, and served in this position and many other legations in Europe and America. In 1913 he was Chargé de Affaires in Mexico, continuing during the period of General Huerta's rule in that country. In 1914 he was appointed special diplomatic agent at Vienna and was first secretary of the Embassy of Rio de Janeiro, in 1915. In the following year he retired from diplomatic service. He took an active part in war work in France during the World War.

O'SHEA, MICHAEL VINCENT, an American educator and author. He was born at Le Roy, N. Y., in 1866, studied at Cornell, where he graduated in 1892, immediately entering the State Normal School at Mankato, Minn., as instructor. Later he taught at Buffalo Teachers' College and the University of Wisconsin, at the same time editing journals connected with education, and presiding over the Society of College Teachers. His works include: "Aspects of Mental Economy"; "Education as Adjustment"; "Method and Management in Teaching"; "Dynamic Factors in Education"; "Social Development and Education"; and "Health and Cleanliness."

OSHIMA, a designation given to about 20 different localities in Japan. The most important of this name is an island about 100 miles long, reaching toward the Bonin Islands. It has a population of about 5,000. The chief industry is fishing. The name is also given to another island of the Luchu archipelago. This is about 34 miles long and 17 miles wide.

OSHKOSH, a city and county-seat of Winnebago co., Wis., on both sides of the Fox river, and on the Minneapolis, St. Paul and Sault Ste. Marie, the Chicago and Northwestern, and the Chicago, Milwaukee, and St. Paul railroads. Here are the court house, city hall, United States government building, public library, high school, School of the Deaf and Dumb, State Normal School, County Hospital for the Incurable Insane, the Northern State Hospital for the Insane, street railroad and electric light plant, waterworks, National and state banks, parks, and several daily and weekly newspapers. It has a large lumbering industry, manufactories of carriages and wagons, machinery, tobacco and flour, and meat packing plants. Pop. (1910) 33,062; (1920) 33,162.

OSIER, in botany, *salix viminalis*, a willow with linear lanceolate acuminate leaves, reticulate above and silky beneath; golden yellow, sessile catkins opening before the leaves, etc., and tomentose

capsules. Cultivated in osier beds, its long pliable shoots being used for wicker-work basket making.

OSIRIS, in Egyptian mythology, one of the chief Egyptian divinities, the brother and husband of Isis, and, together with her, the greatest benefactor of Egypt, into which he introduced a knowledge of religion, laws and the arts and sciences. His principal office, as an Egyptian deity, was to judge the dead, and to rule over that kingdom into which the souls of the good were admitted to eternal felicity. He was that attribute of the deity which signified the divine goodness; and as an *avatar*, or manifestation of the divinity on earth, he was superior to any even of the Egyptian gods. He was styled Manifester of Good, President of the West, Lord of the East, Lord of Lords, Eternal Ruler, King of the Gods, etc. He was venerated under the form of the sacred bulls Apis and Mnevis; or as a human figure with a bull's head, distinguished by the name Apis-Osiris, and is usually represented as clad in pure white. His general attributes are the high cap of Upper Egypt, a flagellum, and sometimes a spotted skin. Under the form of the sacred bull Apis he was supposed to be always present among men.

OSKALOOSA, a city and county-seat of Mahaska co., Ia.; between Des Moines and Keokuk rivers, and on the Chicago, Rock Island, and Pacific, the Burlington Route, and the Minneapolis and St. Louis railroads; 62 miles S. E. of Des Moines. It contains Oskaloosa College (Christian), Penn College (Friends), a business college, preparatory and normal schools, high school, public library, electric lights, National and state banks, and a number of daily and weekly newspapers. It is in a rich coal, iron, limestone, and fire clay region, and has manufactories of iron and brass goods, iron furnaces, vitrified brick works, woolen goods and flour mills, etc. Pop. (1910) 9,466; (1920) 9,427.

OSLER, SIR WILLIAM. Physician and author. He was born in 1849 at Bondhead, Ontario, Canada, and graduated as M.D. from McGill University, Montreal, in 1872, after studying also in England, Germany, and Austria. On returning from abroad he taught pathology at McGill, and in 1884 was named professor of clinical medicine at Pennsylvania University and five years later of medicine at Johns Hopkins. In 1905 he went to live in England, and after six years' residence there was made a baronet, having lectured at Oxford and at St. George's Hospital, London. Osler was a voluminous essayist and wrote much on cancer, chorea, blood platelets, displaying much originality. He gained considerable notoriety by putting forty as almost the terminus to the age of human usefulness, but his extravagance on the one side was balanced by contributions in his special field on the other. During the World War he presided

SIR WILLIAM OSLER

over the medical departments of the British forces, and organized several medical units. His works include: "Histology Notes"; "Cerebral Palsies of Children"; "Principles and Practice of Medicine"; "Science and Immortality"; "Counsel and Ideals"; "An Alabama Student"; "A Way of Life." He died in 1919.

OSMAN. See OTHMAN.

OSMIUM, in chemistry, a tetrad metallic element, discovered by Tennant in 1804; symbol, Os; at. wt., 190.9; occurs combined with iridium, forming the native alloy osmiridium, in platinum ore.

OSMOSE, in chemistry, osmosis, the mixing of dissimilar substances through a porous diaphragm—a phenomenon due to the attraction which the liquids have for each other.

OSMUNDA, in botany, fern royal, osmund royal, or flowering fern; the typical genus of *Osmundeæ*. Six are known. One, *O. regalis*, the common osmund

royal, or flowering fern, is the noblest of domestic ferns; the fronds are bipinnate, fertile at the top. It is frequent in boggy places and the wet morasses of woods in the W. of Scotland and the S. of Ireland. Found also in England, Continental Europe, Asia, and Canada. The powdered stem has been used successfully in rickets, the dose being three drachms. Sometimes this fern has been called bog onion.

OSNABRÜCK, a town of Prussia; province of Hanover, in the valley of the Hase, 75 miles S. S. W. of Bremen. Its great Catholic cathedral, in the Transition style of the first half of the 13th century, is rich in relics and monuments; and the town hall (1486–1512) contains portraits of all the plenipotentiaries who here, Oct. 24, 1648, signed the peace of Westphalia. Osnabrück has important iron and steel works, and manufactures of railway plants, agricultural machinery, gas-meters, paper, tobacco, etc. It suffered much in the Thirty Years' War, (1618–1648), but recovered, thanks to its linen industry, during the eighteenth century. The name Osnaburgs given to coarse linens is derived hence. Pop. about 75,000.

OSPREY, or **OSPRAY**, in ornithology, *Pandion haliaëtus*, the fish hawk, bald buzzard, or fishing eagle. A bird of prey, of almost world-wide distribution, subsisting on fish. The osprey is about two feet long, with a wing expanse nearly three times as great. The plumage is dark brown, white on the under surface,

AMERICAN OSPREY

with a few streaks of brown on the throat; crown light brown edged with white, and a streak of dark brown from the eye to the shoulders. Ospreys nest usually near the seashore, and, unlike rapacious birds generally, are in some measure gregarious. In North America large communities of ospreys are found. They lay three or four eggs of a rich red to buffy white, with large reddish and brown markings.

OSSA, the ancient name of a mountain on the E. side of Thessaly, near Pelion, and separated from Olympus by the vale of Tempe. The ancients placed the seat of the Centaurs and Giants in the neighborhood of Pelion and Ossa.

OSSIAN, a mythical Gaelic hero and bard, is said to have lived in the 3d century, and to have been the son of Fingal, a Caledonian hero, whom he accompanied in various military expeditions. His name has derived its celebrity from the publications of Macpherson, who, about 1760, gave to the world, as the "Poems of Ossian," a remarkable series of ballads.

OSSIFICATION, the formation of bone. In the growth of the skeleton of man and the higher animals, this process goes on naturally, and it occurs in the reproduction of new bones after the destruction or loss of old ones. Ossification also occurs as an unnatural or morbid process. It occurs most frequently in the cartilage of the ribs, after the 50th year; but in some cases it commences between the ages of 30 and 40. The cartilages of the windpipe are next to those of the ribs in their liability to become osseous. The disease called "ossification of the heart" is not an affection of the proper substance of that organ, but of its valves, in which earthy matter is sometimes deposited.

OSSINING, a village in Westchester co., N. Y., on the Hudson river, and on the New York Central and Hudson River railroad; 30 miles N. of New York. It is situated at the widest part of the river on ground rising to an altitude of 300 feet, and commands a fine view of many interesting points on the river. Here are military academies, street railroad and electric light plants, a portion of the Croton aqueduct, which is carried across Kill brook by a stone arch 88 feet wide and 70 feet high; National and savings banks, and several weekly newspapers. It has manufactories of lime, sleighs, carriages, cotton gins, steam engines, gas and water pipe, etc. A State penitentiary, one of the most famous of American prisons, is located here. On this account, after many attempts to have its former name, Sing Sing, changed, the Legislature in 1901 granted this privilege, and the name Ossining was adopted. Pop. (1910) 11,480; (1920) 10,739.

OSSOLI, MARCHIONESS D', SARAH MARGARET FULLER, best known as MARGARET FULLER, an American writer

on literature, art and society; born in Cambridgeport, Mass., May 23, 1810. For some years she taught in girls' schools; edited the "Dial" (1840–1842). Her collected essays on "Women in the Nineteenth Century" were published in 1843. She contributed regularly to the New York "Tribune" papers on literature and art. At Rome she married the Marquis d'Ossoli. The pair were on their way to New York when their ship was wrecked and both were lost. Her other books are: "Art, Literature, and Drama"; "At Home and Abroad"; "Life Without and Life Within." She died July 19, 1850.

OSTEND, a fashionable watering place in the Belgian province of West Flanders, on the German Ocean, 77 miles W. N. W. of Brussels. Two spacious floating basins for the Dover mail-packets were completed in 1874; and as a station also for London steamers, and the terminus of various lines of railway, Ostend is a lively and active place of transport traffic. It is an important fishing station, and has a good school of navigation, a handsome Cursaal (1878), a city hall (1711), a fish market, and a lighthouse (1771; 175 feet). The manufactures include linen, sail cloth, candles, and tobacco. Dating from 1072, Ostend is memorable for the protracted siege by the Spaniards which it underwent from July 7, 1601, to Sept. 20, 1604. Twice again it surrendered—to the Allies in 1706, and to the French in 1745. The fortifications have been demolished since 1865. Pop. about 45,000.

In the World War (1914-1918) Ostend was for a brief period the capital of Belgium. Occupied by the Germans Oct. 5, 1914. It was bombarded 187 times in the course of the war, during which 271 persons were killed and 496 injured, with damage to the town of $15,400,000.

OSTEOLEPIS, a genus of fossil ganoid fish peculiar to the Old Red Sandstone. It is characterized by smooth rhomboidal scales, by numerous sharply pointed teeth, and by having the two dorsal and anal fins alternating with each other. The body is long and slender.

OSTEOLOGY, a discourse or treatise on the bones; that branch of anatomy which describes the bones and their uses. See ANATOMY: BONE.

OSTEOPATHY, a system of healing, founded by Dr. A. T. Still. In spite of the apparent etymology of the name, the system does not confine itself to the treatment of bone diseases, but claims to be a general system founded on the principle that "all bodily disorders are the result of mechanical obstruction to the free circulation of vital fluids and forces." Its apparently marvelous cures are accomplished through purely scientific methods, based on a profound knowledge of the human mechanism. The diagnosis is largely through the sense of touch, which is developed to its highest perfection. The osteopath takes the position that when all obstructions to the proper direction of the life giving and healing energies that are resident in the body—such as maladjustments or abnormalities of the bodily machine in any of its parts—are detected and corrected, by a thorough knowledge of anatomy and physiology, nature fast regains her equilibrium of health and strength. No medicine whatever is used and no surgery employed, except in cases where the latter is needed exclusively. In 1892 Dr. Still organized a college at Kirksville, Mo., under the laws of that State. A large building was erected in 1895 and additions made in 1896. The school began with 28 students and has steadily increased in numbers. It has between 300 and 400 students.

The first state to legalize the practice of osteopathy was Vermont in 1896. Missouri, Michigan and North Dakota in 1897. Iowa 1898. South Dakota, Illinois and Tennessee 1899. Osteopathy is now practiced in England, Ireland, Scotland, France, Germany and Sweden. The parent schools of the American Society of Osteopathy, Kirksville, Mo., established in 1892, has graduated 2000 practitioners.

OSTERHAUS, HUGO. A rear-admiral in the United States Navy. He was born in Belleville, Ill., in 1851 and graduated from the United States Naval Academy in 1870. He commanded the battleship "Connecticut" in the voyage of the American Fleet around the world in 1907. A rear-admiral's commission was given him in 1909. In 1911 he was commander-in-chief of the Atlantic Fleet, He retired at the age limit in 1913.

OSTERHAUS, PETER JOSEPH, an American military officer; born Coblenz, Germany, about 1820; emigrated to the United States, and was made a major of Missouri volunteers early in the Civil War; commanded a brigade under Fremont, and a division in the battle of Missionary Ridge. He was promoted to Major-General of volunteers in 1864. After the war he was appointed United States consul at Lyons, France, and finally returned to Germany. He died in 1914.

OSTERODE, a town of Hanover, Prussia, at the W. base of the Harz Mountains, on the Söse, an affluent of the Leine, 30 miles N. W. of Nordhausen. Its church of St. Giles (724; rebuilt 1578) contains the graves of the dukes of Grubenhagen, and there are also a fine town hall, baths, large grain stores, and cotton, woolen, and linen factories. OSTERODE, in East Prussia, on the Drewenz, 77 miles N. E. of Thorn, has a castle of the Teutonic knights (1270) and iron manufactures. Pop. about 8,500.

OSTIA, an ancient city of Italy, at the mouth of the Tiber, 6 miles from Rome by the "Way of Ostia." It was of great importance as the port of Rome and as a naval station, and for a long period it engrossed the whole trade of Rome by sea. It was destroyed by the Saracens in the 9th century. Its ruins comprise tombs, two temples, a theater, etc. The modern Ostia (founded by Gregory IV. in 830) is a miserable village with but few inhabitants.

OSTIAKS, or **OSTYAKS**, a Ural-Altaic people living along the lower course of the river Ob in Western Siberia, where they struggle against chronic poverty, drunkenness, frequently famine, to get a living by fishing and hunting fur-bearing animals. They dwell in wretched and very dirty huts, eat flesh raw, use bows and arrows, and weapons of bone and stone; and are still in great part heathens. They are decreasing in numbers, and are estimated now at about 20,000. Their language belongs to the Finnish division.

OSTRACISM, a practice introduced into Athens by Kleisthenes to preserve the democratic government which he had established, and which sooner or later existed also in Argos, Megara, Miletus, and Syracuse. If any citizen became so powerful that it was feared he would attempt to overthrow the government, an ostracism was asked from the Athenian senate and the public assembly. If granted, the citizens each deposited a shell or potsherd on which was written the name of any person of whom they entertained apprehension, and if 6,000 concurred in voting against the same individual, he was required to go into honorable banishment for 10 years, retaining, however, all his property.

OSTRICH, in ornithology, *Struthio camelus*, from the deserts of Africa and Arabia. It is the largest of all living birds, standing from six to eight feet in height, and has been known from remote antiquity. The ostrich is hunted and bred for the sake of the quill feathers of the wings and tail, now used by women principally, though formerly ostrich plumes decked the helmets of knights, still later, the hats of the cavaliers, and the fashion came in again for a time at the Restoration. The ostrich is a vegetable feeder, but swallows stones, bits of iron, and other hard substances to aid the gizzard in its functions. The head and neck are nearly naked, body black, quill feathers of wings and tail white. The wings are useless for flight, but of so much assistance in running that the bird can outstrip the fleetest horse. Ostriches are polygamous, the hens lay their eggs in a common nest—a hole scratched in the sand, and the cockbird relieves the hens in the task of incubation, which is aided by the heat of the sun.

OSTROGOTHS, the E. branch of the Gothic race that, in a very early day, lived in Southern Russia near the Valley of the Don. Here in A. D. 375 they were attacked and conquered by the Huns. In 378 many of them settled in Pannonia. Theodoric became their king in 474, and in 479 led them over the Julian Alps, conquered Odoacer in 493 and became King of Italy. The country prospered under his reign. Belisarius endeavored to expel these people and in 552 the kingdom was taken from them and they gradually became incorporated with other nations.

OSTROLENKA, Poland, formerly in Russian Poland, when it was a district town in the government of Lomza, on the River Narew, and on the Ostrolenka-Piljava railways. During the great World War it was the center of almost continuous fighting for over a year, being held alternately by both Russians and Germans. Pop. about 17,500.

OSTUNI, a city of Italy, in the province of Lecce, about 20 miles N. W. of Brindisi. The city has a cathedral built in the 15th century, a library and a museum. Pop. about 25,000.

OSTWALD, WILHELM. German chemist. Born at Riga, Prussia, he graduated at Dorpat, and taught chemistry there and at Riga and then for twenty years at Leipzig University, acting as Harvard exchange professor in 1906. In 1909 the Nobel prize for chemistry was awarded him, as a result of his discoveries in respect to the color of ions, the conductivity of organic acids, and their chemical reaction. His works include several text-books on general chemistry as well as "Elektrochemie"; and "Vorlesungen über Naturphilosophie." He edited numerous scientific re-

prints and "Zeitschrift für physikalische Chemie."

OSWALD, ST., king of Northumbria, son of the conquering Ethelfrith of Bernicia and of Acha, sister of the brave Edwin of Deira. He fought his way to the throne by the defeat, at Heavenfield near Hexham (635), of Cædwalla, the Welsh king, who had aided Penda to crush Edwin at Hatfield two years before. Under the reign of Edwin he had found shelter in Scotland, and been converted to Christianity at Hii or Iona; and now, when he was hailed king of the whole of Northumberland, he established Christianity with the help of St. Aidan, who settled on Holy Island. Oswald was acknowledged as overlord by all the kingdoms save those subject to Penda. He fell fighting against his enemy at Maserfield (Oswestry) in 642.

OSWEGO, a city and county-seat of Oswego co., N. Y.; on the Oswego river, the Oswego canal, and the New York, Ontario and Western, the Lackawanna, and the New York Central railroads; 36 miles N. of Syracuse. The city has two harbors, one at the immediate mouth of the river and one in Lake Ontario. It is a terminus of the New York State Barge Canal. It contains a State Normal School, United States Government building, Gerritt Smith library, orphan asylum, public hospital, high school, electric light and street railroad plants, National and savings banks, and several daily and weekly newspapers. There are manufactories of boilers and engines, tools, pumps, automobile parts, hosiery, matches, starch, etc. Oswego has regular steamboat communication with the cities of the Great Lakes; imports about $1,400,000, and exports, $4,000,000. Pop. (1910) 23,368; (1920) 23.626.

OSWEGO, FORT, an old French fort, built on the site of the present city of Oswego, N. Y., by Count Frontenac, about 1696. Fort Ontario, however, was built on the opposite side of the Oswego river in 1755, and at once took the precedence. Both forts were the scenes of considerable fighting during the French and Revolutionary Wars, and once in 1814.

OSWEGO RIVER, a river in New York formed by the junction of the Seneca and Oneida rivers 12 miles N. W. of Syracuse. It is 24 miles long.

OSWEGO TEA, a name given to several species of Monarda, particularly *M. purpurea*, *M. didyma*, and *M. kalmiana*, natives of North America, because of the occasional use of an infusion of the dried leaves as a beverage, said to be useful in intermittents and as a stomachic. Some other species of Monarda are used in the same way, and the three species named are not uncommonly cultivated in gardens for ornament.

OSWESTRY, a thriving market town and municipal borough of Shropshire, England, 18 miles N. W. of Shrewsbury. It has an old parish church, restored in 1872; a fragment of the Norman castle of Walter Fitzalan, progenitor of the royal Stewarts; and a 15th century grammar school. Oswestry derives its name from St. Oswald, who was slain here.

OTAGO, one of the provincial districts of New Zealand, including the whole of the S. part of South Island, S. of the districts of Canterbury and Westland, being surrounded on the other three sides by the sea; area, about 15,000,000 acres. The interior is mountainous; many peaks attain the height of from 3,000 to 9,000 feet, but there is much pastoral land; the N. E. consists of extensive plains. Otago, though it possesses valuable gold fields, is chiefly a pastoral and agricultural district, second only to Canterbury in wheat production. Coal has been found in abundance. Otago was founded in 1848 by the Scotch Free Church Association; it is now the most populous division of the colony. The capital is Dunedin; the next town in importance is Oamaru. Pop. Otago portion about 135,000; Southland portion about 65,000.

OTALGIA, neuralgia of the ear. Its causes and treatment are those of neuralgia generally, but it is particularly caused by caries of the teeth.

OTHMAN, or **OSMAN**, founder of the Ottoman empire; born in 1259; one of the emirs who, on the destruction of the empire of the Seljukides, became independent chiefs. Joined by other emirs, he invaded the Eastern Empire in 1299, and made himself master of Nicæa, Iconium, and other towns. He took no other title than Emir, but ruled with absolute power, not without justice and moderation. He died in 1326.

OTHO I., Emperor of Germany, called THE GREAT; born in 912; was the eldest son of Henry the Fowler, and crowned King of Germany in 936, at the age of 24. He carried on war with the Huns, and drove them from the West; made Bohemia his tributary; deprived the Duke of Bavaria of his estates, and then had to encounter the resistance of the great chieftains of the empire, aided by the King of France. He afterward aided

the same king against his revolted vassal, Hugh the Great, defeated the Danes, and again invaded Bohemia. He was then engaged for 10 years in war with the Hungarians, and finally defeated them at Leck. Berenger having usurped the title of Emperor of Italy, Otho entered Rome, where he was crowned Emperor by John XII. That pontiff afterward leagued with Berenger, on which Otho caused him to be deposed, and put Leo VIII. in his place, in 963. On the emperor's return to Germany, the Romans revolted and imprisoned Leo; for which Otho again visited Rome, which he besieged and restored Leo. He next turned his arms against Nicephorus, Emperor of the East, whose army he defeated. John Zimisces, the successor of Nicephorus, made peace with Otho, who died in 973.

OTHO II., surnamed the BLOODY; born in 955, succeeded Otho I., his father, in 973. His mother, Adelaide, opposed his accession, her party proclaiming Henry, the Duke of Bavaria, emperor. Otho expelled his mother from the court, defeated Henry, repulsed the Danes and Bohemians, and afterward marched into Italy to expel the Saracens, but he fell ill at Rome, where he died in 983.

OTHO III.; born in 980; succeeded Otho II., his father, in 983. The empire was administered during his minority by his grandmother Adelaide, conjointly with the Archbishop of Cologne. At the age of 16 he assumed the reins of government, and went to Italy, which was in a state of confusion, owing to the opposition of different Popes. Otho having re-established order, returned into Germany, and made Boleslas King of Poland. He was obliged again to pass into Italy to quell a revolt, but died soon afterward, in 1002.

OTHO IV., called the SUPERB, was the son of Henry, Duke of Saxony, and chosen emperor in 1208. He was excommunicated by the Pope for seizing the lands which the Countess Matilda bequeathed to the Holy See. In 1212 the princes of the empire elected Frederic, King of Sicily, in the room of Otho, who, after struggling against his rival till 1215, resigned his crown to him, and retired to Brunswick. He died in 1218.

OTHO, KING OF GREECE, 2d son of Louis I., King of Bavaria; born in Salzburg, July 1, 1815. At 17 years of age he was invited by the Greeks to become their monarch, and this proposition being acceded to by the governments of Great Britain, France, and Russia, in a treaty concluded in London in May, 1832, Otho was accordingly declared King of Greece in January, 1833, and, in June, 1835, on his attaining the age of 20, he assumed the reins of government. Otho, however, soon became unpopular with his subjects, owing to his selection of Bavarians as his cabinet advisers, and, also, to the strong pro-German sympathies he continually manifested. After a stormy and inglorious reign of 30 years, Otho abdicated the throne, Oct. 20, 1862, and fled the country, which was then in a state of insurrection against the royal authority. He died in Bamberg, Bavaria, July 26, 1867.

OTHO, MARCUS SILVIUS, a Roman emperor; born in Rome, A. D. 32. After Nero's death, he attached himself to Galba, but that emperor having adopted Piso as his heir, Otho excited an insurrection, murdered Galba and Piso, and ascended the throne in 69. He was opposed by Vitellius, who was supported by the German army, and in a battle between the two rivals near Bedriacum, Otho was defeated, on which he slew himself, after reigning three months.

OTIS, ELWELL STEPHEN, an American military officer; born in Frederick, Md., March 25, 1838; was graduated at Rochester (N. Y.) University in 1858, and began the study of law. When the Civil War broke out, he entered the volunteer service as captain in the 140th New York Infantry. He took an active part in the battle of Gettysburg. At the battle of the Wilderness, he commanded as lieutenant-colonel the picket line of the 5th Corps, which brought on the engagement. At Spottsylvania the regiment lost its colonel and Otis succeeded to the command. He was severely wounded near Petersburg, Oct. 1, 1864, and was disabled for duty. He was discharged from the volunteer service Jan. 24, 1865, with the brevet rank of Brigadier-General. In 1866 he was appointed lieutenant-colonel of the 22d United States Infantry, and became colonel of the 20th Infantry in 1880. From 1867 to 1881 he served with the army in the West against the Indians. In 1881 he organized the School of Infantry and Cavalry at Fort Leavenworth, Kan.; Nov. 28, 1893, was promoted to the full rank of Brigadier-General. On Dec. 1 of the same year he was assigned to the command of the Department of the Columbia, with headquarters at Vancouver, and in 1897 was transferred to the Department of Colorado. On May 28, 1898, he was appointed Major-General of volunteers and assigned to duty in command of the Department of the Pacific, and as military governor of the Philippines, which

office he held till May 5, 1900. He was a member of the Philippine commission, and on June 16, 1900, was promoted Major-General, U. S. A., and later assigned to the Department of the Lakes. He died Oct. 21, 1909.

OTIS, HARRISON GRAY, an American statesman, son of James; born in Boston, Mass., Oct. 8, 1765; was member of Congress, 1797–1801, and United States Senator, 1817–1822. He was prominent in the Massachusetts Legislature; took an active part in the Hartford Convention of 1814; and was mayor of Boston in 1829. His published works include: "Letters in Defense of the Hartford Convention" (1824), and "Orations and Addresses." He died in Boston, Oct. 28, 1848.

OTIS, JAMES, an American statesman; born in West Barnstable, Mass., Feb. 5, 1725. At an early age he attracted attention by his eloquence in behalf of the colonists against British oppression, and his determined opposition to the "writs of assistance" in 1761. Through his efforts the Stamp Act Congress was assembled in 1765. He was the author of a number of political essays and orations, among which are "Vindication of the Conduct of the House of Representatives" (1762); "Rights of the British Colonies Asserted" (1765); "Consideration on Behalf of the Colonists" (1765). He died in Andover, Mass., May 23, 1783.

OTOMIS, a tribe of Mexican Indians, and one of the oldest nations in the mountainous regions of the plateau. They were agriculturists and had some knowledge of the manufacture of cloth and ornaments of gold and copper. During the siege of Mexico they came to the assistance of Cortez (in 1521), and have ever since been nominally in subjection to the whites. They accepted the Catholic faith, but have made little progress in civilization. Their descendants, about 200,000, mostly live in the mountains of Querétaro, Guanajuato and Hidalgo. They speak Spanish and Mexican.

OTRANTO (the ancient Hydruntum), a town in the extreme S. E. of Italy, 29 miles S. E. of Lecce, and on the Strait of Otranto, 45 miles from the coast of Albania on the opposite side. During the later period of the Roman empire, and all through the Middle Ages, it was the chief port of Italy on the Adriatic, whence passengers took ship for Greece —having in this respect supplanted the famous Brundusium of earlier times; but its port is now in decay.

OTTAWA, one of the largest rivers of British North America, rises nearly 300 miles due N. of Ottawa city, flows W. to Lake Temiscamingue, some 300 miles, and thence 400 miles S. E., and falls into the St. Lawrence by two mouths, which form the island of Montreal. Its drainage basin has an area variously estimated at from 60,000 to 80,000 square miles. During its course it sometimes contracts to 40 or 50 yards; elsewhere it widens into numerous lakes of considerable size. It is fed by many important tributaries, the Petewawa, Bonnechère, Madawaska, Rideau, Coulonge, Gatineau, and Rivières du Lièvre and du Nord. These, with the Ottawa itself, form the means of transit for perhaps the largest lumber trade in the world.

OTTAWA, a city of Ontario, Canada, the capital of the Dominion, and the county-seat of Carleton co. It is on the right bank of the Ottawa river at the junction of the Rideau. It is on the Canadian Pacific, the Canadian Northern, the Grand Trunk, and the Ottawa and New York railroads. There is steamship communication by the Ottawa river with Montreal and by the Rideau Canal with Lake Ontario. The Ottawa river rushes over several cataracts and falls near the city. The city has an area of 5,295 acres or approximately 8 square miles. The Ottawa river and its tributaries furnish an abundance of water power which is employed by the industries of the city. It is estimated that within 50 miles there is available 1,000,000 hydraulic horse power.

The city is attractively situated in the midst of picturesque and beautiful scenery. It is essentially a city of homes. It is in the center of one of the most attractive agricultural belts in Ontario and is also the center of an extensive lumber region. The river is spanned by several large bridges and the Rideau Canal divides the city into the Upper Town or western portion and the Lower Town or eastern portion, the former being distinguished by its predominantly English and the latter by its predominantly French population.

The streets are wide and attractively laid out at right angles. The most notable buildings are those of the Dominion Parliament. The Parliament buildings were burned in 1916 but their rebuilding was at once begun and in 1921 the main structure was almost completed. Other notable buildings include the Roman Catholic Cathedral of Notre Dame, Christ Church, city hall, Rideau Hall, the residence of the governor-general, several large hospitals, the Agricultural and Industrial Exhibition building, pub-

lic library, and the National Victoria Museum. Ottawa is an important educational center. There are 24 public schools and over 30 separate schools, including a model and normal school. It is the seat of Ottawa University and has in addition many business colleges, women's colleges, convents, and private schools.

All the great Canadian banks have branches in Ottawa. The bank clearings in 1918 amounted to $357,958,751. There is an exceptionally attractive park system. The largest park is Rock Cliffe, which contains 89 acres. The assessed valuation of property in 1919 was $158,846,717. There are nearly 200 light plants, National banks, and several daily and weekly newspapers. It has manufactories of window glass, bottles, and lamp chimneys, drain-tile, sewer-pipe, fire-brick, organs, carriages, flour, saddlery, pumps, harness, lumber, agricultural implements, etc. Pop. (1910) 9,535; (1920) 10,816.

OTTAWA, a city and county-seat of Franklin co., Kan.; on the Marais des Cygnes river, and on the Missouri Pacific, and the Atchison, Topeka, and Sante Fé railroads; 58 miles S. W. of Kansas City. Here are the Ottawa University (Bapt.), Chautauqua Assembly, high school, public library, Sante Fé Hospital, National

CANADIAN PARLIAMENT BUILDING AT OTTAWA

manufacturing establishments and the manufactures include wood products, paper, cement, carbide, foundry products, mica and clothing. Ottawa is the seat of the Roman Catholic Archbishop of Ottawa and of the Anglican Bishop of Ottawa. The city was founded in 1827 and was incorporated under its present name in 1854. It was selected by Queen Victoria as the capital of Canada, in 1858. Pop. (1911) 87,062; (1920) 127,468.

OTTAWA, city and county-seat of Lasalle co., Ill.; at the confluence of the Illinois and Fox rivers, on the Illinois and Michigan canal, and on the Burlington Route, the Chicago, Rock Island, and Pacific and the Chicago, Ottawa and Peoria railroads; 85 miles S. W. of Chicago. Here are Pleasant View College (Luth.), St. Francis Xavier Academy, Ryburn Memorial Hospital, business college, parks, Reddick Library, court house, street railroad and electric and State banks, gas and electric lights, and daily and weekly newspapers. It has manufactories of carriages, furniture, soap, flour, gas engines and foundry products. Pop. (1910) 7,650; (1920) 9,018.

OTTAWA UNIVERSITY, a coeducational institution in Ottawa, Kan.; founded in 1865 under the auspices of the Baptist Church; reported at the close of 1919: Professors and instructors, 22; students, 186; president, S. E. Price, D. D.

OTTER, in zoölogy, the genus *Lutra* and especially *L. vulgaris*, the common otter. The animals vary greatly in size; but the total length averages about 40 inches, of which the tail constitutes rather more than a third. The fur is of a soft, brown color, lighter on throat and breast, and consists of long, coarse, shining hairs, with a short under fur of fine texture. The otter lives exclusively

on fish, and is therefore rarely met with far from water. The female produces from three to five at a birth, usually in March or April, and brings them up in a nest formed of grass, and usually in a hollow in a river bank or in the shelter of the roots of some overhanging tree.

OTTER

In angling, an instrument for fishing, so called from its destructive nature. It is a float, from which lines run out with bait or flies, and which is either moored or trailed parallel to a boat. Called also a trot line. In entomology, the larva of the ghost moth.

OTTERBEIN UNIVERSITY, a coeducational institution in Westerville, O.; founded in 1847 under the auspices of the United Brethren; reported at the close of 1919: Professors and instructors, 25; students, 474; president, W. G. Clippinger.

OTTERBURN, a township of England, Northumberland county, 20 miles N. N. W. of Hexham. About half a mile from the village is an obelisk marking the spot where Earl Douglas fell in the battle of Chevy Chase, in 1388.

OTTERY ST. MARY, a town of Devonshire, on the river Otter, 11 miles E. of Exeter. Twice the scene of a great conflagration, in 1767 and 1866, it retains its magnificent collegiate church, a reduced copy of the cathedral of Exeter, with the only other transeptal towers in England. Begun about 1260 by Bishop Bronescombe, it is Early English, decorated, and perpendicular in style and was restored by Butterfield in 1849–1850. The old King's grammar school was demolished in 1884. Alexander Barclay was a priest here; Coleridge was a native; and "Clavering" in "Pendennis" is Ottery St. Mary, the Devonshire residence of Thackeray's stepfather. Silk shoe laces, handkerchiefs, and Honiton lace are manufactured.

OTTOMAN EMPIRE. See TURKEY.

OTTUMWA, a city and county-seat of Wapello co., Ia.: on Des Moines river, and on the Burlington Route, the Wabash, and other railroads; 75 miles W. of Burlington. The city has a United States Government Building, Normal School, business college, Hawkeye Hospital, court house, National and State banks, and daily and weekly newspapers. It is in a rich coal region, and contains oil and starch mills, iron works, meat-packing plant, and numerous other industries. Pop. (1910) 22,012; (1920) 23,003.

OTWAY, THOMAS, an English dramatist; born in Trotton, Sussex, in 1652; educated at Winchester, and at Christ Church, Oxford; served as cornet in the Low Countries; was an unsuccessful actor, and finally wrote for the stage. Of his many plays, one tragedy, "Venice Preserved," is among the best remembered of the Restoration drama, and keeps his name familiar in literary allusion. "The Orphan" ranks next in critical esteem. He died in 1685.

OUDENARDE, a town of Belgium, on the Scheldt, 37 miles W. of Brussels. It has a fine Gothic town hall (1535) and two interesting churches. Margaret of Parma was born here. In 1706 Oudenarde was taken by Marlborough; and an attempt made by the French to retake it brought on the famous battle of Oudenarde, the third of Marlborough's four great victories, which was gained, on July 11, 1708, with the aid of Prince Eugene, over the French under the Duke of Burgundy and Marshal Villars. Pop. about 7,500. The town was occupied by the Germans early in the World War (1914-1918). An American division, the 91st was here engaged in attacks on the German forces when the armistice was declared.

OUDH, a province and town of British India, separated on the N. from Nepal by the lower ranges of the Himalaya, whence it gradually slopes, a great plain watered by the Gumti, Gogra, and Rapti rivers, to the Ganges; area 24,158 square miles. Pop. province, about 13,000,000. Town, 23,000, mostly Hindus, though the dominant native race for centuries has been Mohammedan. The Brahmans are the most numerous class, about one-eighth of the whole population. Oudh is believed to have been one of the oldest seats of Aryan civilization in India. After being the center of a long native Hindu dynasty it was subjugated by the ruler of Kanauj, and in 1194 was made subject to the Mussulman empire of Delhi. In 1732–1743 it became virtually an independent state, and the dynasty of the Nawabs lasted till the annexation of the province by the British in 1856. Dur-

ing the mutiny of 1857 Oudh was one of the centers of rebellion and the scene of highly dramatic events.

OUDINOT, CHARLES NICOLAS, Duke of Reggio and Marshal of France; born in Bar-le-Duc, in 1767. He entered the army when 19 years of age, and when the Revolution broke out held the rank of captain. He embraced the popular cause, and rising to the rank of general, accompanied Massena into Italy as one of his staff officers, in 1799. His fortunes from this time were linked with those of Napoleon till the capitulation of Paris, March 31, 1814, when he became a Bourbonist. In that character he headed the army that invaded Spain in 1823, and was resident at Madrid some months as governor. He succeeded Marshal Moncey as governor of the Invalides in 1842, and died in 1847. His son, CHARLES NICOLAS-VICTOR OUDINOT, Duke of Reggio (1791–1863), was a general in the French army. He first distinguished himself in Algeria, and was general of the French expedition against Rome in 1849.

OUIDA, pseudonym of the novelist LOUISE DE LA RAMÉE, born about 1840; spent part of her girlhood with her mother at Bury St. Edmunds and afterwards lived in London where she wrote for the leading magazines. After 1875 or 1876 she lived on the continent, principally at Florence, Italy. She was the author of a number of novels, volumes of short stories and essays, among the most noted are: "Strathmore" (1865), "Idalia" (1867), "Under Two Flags" (the best, 1868), "Puck" (1869), "Folle Farine" (1871), "Pascarel" (1873), "Ariadne" (1877), "Moths" (1880), "Princess Napraxine" (1884), "Two Offenders" (1894), "A Story of Venice" (1895), "Town" (1897), "La Strega" (1899), etc. She died Jan. 25, 1908.

OUNCE, a unit of weight. In troy weight, the ounce is one-twelfth of a pound, contains 20 pennyweights of 24 grains each, and is, therefore, equivalent to 480 grains. In avoirdupois weight, the ounce is the sixteenth part of a pound, and is equivalent to 437½ grains troy. Also a money of account in Morocco, valued at about six cents. In zoölogy; *Felis uncia*, the snow leopard; habitat, the Himalayas, at an elevation ranging from 9,000 to 18,000 feet. It is about the size of a leopard, of which it is probably an immature form; ground color pale yellowish-gray, dingy, yellowish-white beneath. The fur is thick, and it has a well marked short mane. It has never been known to attack man.

OUNDLE, a small but ancient and pleasant town of Northamptonshire, England, 13 miles S. W. of Peterborough; has an old church, partly Early English and partly Decorated style, restored in 1864. Here St. Wilfrid died. Laxton's grammar school dates from 1550.

OUSE, a river of England, York co., formed by the junction of the Swale and Ure, and after a S. E. course of 60 miles, unites with the Trent to form the estuary of the Humber. It is navigable for large vessels 45 miles, or to York. OUSE (GREAT) rises near Brackley, Northampton county, and after a N. E. course of 160 miles, two-thirds of which is navigable, enters the Wash at Lynn Regis. OUSE (LITTLE) or BRANDON RIVER, falls into the Great Ouse, at the junction of the river Stoke, and the New Bedford and Wisbeach canal.

OUTCROP, in mining and geology, a term used by miners, but now adopted by geologists, for the exposure of any portion of a stratum which comes out upon the surface, or for the part of the stratum thus exposed.

OUTLAWRY, the act of outlawing; the state of being outlawed; the putting a man out of the protection of the law, or the process by which a man is deprived of that protection, as a punishment for contempt in refusing to appear when called into court. Formerly any one might kill an outlawed person without incurring any penalty, but now the wanton killing of an outlaw is considered as murder. In England criminal outlawry has been in abeyance since 1859; civil outlawry was abolished in 1879. In the U. S. civil outlawry is unknown, and criminal outlawry has been obsolete since the Revolution.

OUTRIGGER, in its proper sense, a beam or spar fastened horizontally to the crosstrees or otherwise, for the purpose of extending further from the mast or topmast the backstay or other rope by which that mast or topmast is supported. The power of the stay is thus increased. The term is also applied to a contrivance used in very narrow racing boats, by which the oar is given the requisite amount of play outboard.

OUTWORKS, all works of a fortress which are situated without the principal line of fortification.

OUZEL, or **OUSEL,** an old name of the blackbird; but also applied to other birds. Thus, one British thrush (*Turdus torquatus*) is called the ring ouzel, and the dipper is very generally known as the water ouzel.

OVAL, an egg-shaped curve or curve resembling the longitudinal section of an egg.

OVARIAN CYSTS, in pathology, one of the three kinds of tumors occasionally arising in the ovary. It consists in the conversion of the gland, or parts of it, into cysts. Ovarian cysts tend to grow to a great size. They are often fatal within four years unless healed by a successful operation.

OVARIOTOMY, the operation of removing the ovary, or a tumor in the ovary; a surgical operation first performed in 1809, and long considered exceedingly dangerous, but latterly performed with great and increasing success, especially since the adoption of the antiseptic treatment inaugurated by Lister.

OVARY, in botany, a hollow case placed at the base of the pistil, and containing one or more cells inclosing ovules. Its normal state is to be superior to the calyx; but in some cases it is adherent to the tube of the calyx, when it is called inferior. It may also be parietal. In physiology, the organ in which the ova or germs of the future offspring are formed and temporarily contained.

OVEN, a close chamber in which substances are baked, heated, or dried; a chamber in a stove or range in which food is baked.

OVEN BIRDS, birds belonging to the family *Certhidæ*, or creepers, found in South America; typical genus, *Furnarius*. They are all of small size, and feed upon seeds, fruits, and insects. Their popular name is derived from the form of their nest, which is dome-shaped, and built of tough clay or mud with a winding entrance.

OVENS RIVER, a river in the N. E. of Victoria, Australia; a tributary of the Murray. The district is an important gold mining and agricultural one.

OVERIJSSEL, or **OVERYSSEL**, a province of the Netherlands; area, 1,283 square miles. It is watered by the Ijssel, which separates it from Gelderland, and by the Vecht and its affluents. Except a strip along the Ijssel, presenting good arable and meadow land, the surface is mostly a sandy flat relieved by hillocks, and the principal industry is stock raising and dairy farming. Chief towns, Zwolle, Deventer, Almelo, and Kampen. Pop. (1917) 431,757.

OVERLAP, a term of geology. When the upper beds of a conformable series of strata extend beyond the bottom beds of the same series, the former are said to overlap the latter.

OVERMAN, LEE SLATER. United States Senator from North Carolina. Born 1854, and graduated from Trinity College, N. C., in 1874. For a few years, while studying law, he was private secretary to the governor of the state, and in 1878 was admitted to the bar. He was elected to the North Carolina House of Representatives in 1883 and between that date and 1900 served four terms. In 1900 he was president of the Democratic State Convention and in 1903 elected United States Senator. He was re-elected in 1909 and 1915.

OVERTURE, in music, an introductory symphony for instruments, chiefly used as an introduction to important musical compositions, as operas, oratorios, etc. Its principal themes are often taken from the work it precedes. In Presbyterianism, a petition or proposal from a Presbytery, or an individual, to the highest court, which is the General Assembly or the Synod, that a new law be created, an old one amended or repealed, or a measure carried into effect. The term was borrowed from the Huguenots.

OVID, PUBLIUS OVIDIUS NASO, a Roman poet of the Augustan age, of the equestrian order; born in Sulmo, 43 B. C. He studied the law, but his decided predilection for polite literature, and particularly poetry, led him to neglect severer studies and on succeeding to the paternal estate, he quitted the bar for poetry and pleasure. Horace and Propertius were his friends, and Augustus was a liberal patron to him; but he at length fell under the displeasure of the emperor, who, for some cause never explained, banished him from Rome, and sent him to live among the Getæ, or Goths, on the Euxine. His chief works are "The Loves," "The Art of Loving," and the "Metamorphoses." He in vain solicited his recall to Rome, and died in Tomi A. D. 18. Ovid possessed high poetical genius. His judgment and taste, however, are sometimes at fault, but no poet, either ancient or modern, has expressed beautiful thought in more appropriate language.

OVIPAROUS, in zoölogy, a term, applied to birds, reptiles, fishes, and insects, whose mode of reproduction is by the exclusion of the germ in the form and condition of an egg, the development of which takes place out of the body, either with or without incubation.

OVULE, in botany, a rudimentary seed which requires to be fertilized by pollen before it develops.

OVUM, in physiology, the germ produced within the ovary, and capable of developing into a new individual. In archæology, ornaments in the form of eggs, curved on the contour of the ovolo, or quarter-round, and separated from each other by anchors or arrow heads.

OWEN, ROBERT, an English social reformer and author; born in Newton, Montgomeryshire, Wales, March 14, 1771. He early turned his attention to social questions, publishing in 1813 "New Views of Society; or, Essays upon the Formation of the Human Character, and Book of the New Moral World." He attempted to found communist societies in England, also in New Harmony, Ind., and later in Mexico. In his later years he became a believer in Spiritualism. His followers bore the name of Owenites, and were among the founders of the English Chartist movement. He died Nov. 19, 1858.

OWEN, ROBERT DALE, an American diplomatist, son of Robert; born in Glasgow, Scotland, Nov. 7, 1801; was educated in Switzerland; removed to the United States in 1825; was Representative to Congress from Indiana (1843–1847); and minister to Naples (1853-1858). During the Civil War he was a prominent advocate of negro emancipation. Among his works are: "Moral Physiology" (1831); "Footfalls on the Boundary of Another World" (1860); "Beyond the Breakers" (1870), a novel; "Threading My Way" (1874). He died in Lake George, N. Y., June 17, 1877.

OWEN, ROBERT LATHAM, United States Senator from Oklahoma, born in Lynchburg, Va., in 1856. He graduated from the Washington and Lee University in 1877. After several years of teaching he studied law and was admitted to practice in 1880. He acted as United States Indian agent for the Five Civilized Tribes from 1885 to 1889. He was elected United States Senator in 1907 and was re-elected in 1913. In the Senate he acted as chairman of the Committee of Banking and Currency in the 65th Congress.

OWEN MEREDITH. See LYTTON, EDWARD ROBERT.

OWEN SOUND, a town in Ontario, Canada, 34 miles W. by N. of Collingwood, at the head of a long bay of the same name off Georgian Bay. It has a dry dock, 300 feet long, 55 feet wide, and 12 feet deep on sill at high water.

OWEN STANLEY RANGE, a portion of a range of lofty mountains in the E. part of British Guinea. Mount Owen Stanley is a peak 13,130 feet high.

OWENSBORO, a city and county-seat of Daviess co., Ky., on the Ohio river, and on the Louisville, Henderson, and St. Louis, the Illinois Central, and the Louisville and Nashville railroads; 40 miles S. E. of Evansville, Ind. Here are Owensboro Female College (nonsect.), St. Francis Academy, a United States Government Building, waterworks, street railroad and electric light plants, and daily and weekly newspapers. The city is noted for its large tobacco interests. It also has manufactories of flour, shingles, brick, ice, sewer pipe, furniture, etc. Pop. (1910) 16,011; (1920) 17,424.

OWENS COLLEGE, Manchester, England, an institution established under the will of John Owens, a Manchester merchant, who died in 1846, and left about $500,000 for the purpose of founding an institution for providing a university education, in which theological and religious subjects should form no part of the instruction given. Teaching commenced in 1851, and the present Gothic building was completed in 1873. The success of the college led to the establishment of a new university, Victoria University, to consist of Owens College and several affiliated colleges located in different towns, but having its headquarters in Manchester. The Victoria University was instituted by royal charter in 1880. University College, Liverpool, was incorporated with Victoria University in 1884, and the Yorkshire College, Leeds, in 1888. There is a women's department in connection with Owens College. The charter of Victoria University gives power to grant degrees to women, and the examinations are thrown open to them.

OWEN'S LAKE, a lake in Inyo co., Cal., crossed in extreme W. by 118° W., 160 miles N. by E. of Los Angeles; its water is strongly impregnated with salt and carbonate of soda; it has no visible outlet; receives Owen's river; length about 16 miles, breadth, 10 miles.

OWEN'S RIVER, a river of California, which flows into Owen's lake. It is 175 miles long.

OWL, in ornithology, a popular name for any nocturnal raptorial bird, of which about 250 species are known. A classification has been proposed, based

on pterylological and osteological characters, broadly dividing the owls into two sections: (1) The screech-owl, and (2) the tawny-owl section, with (the Linnæan) *Strix flammea* and *S. stridula* as the respective types. The former is known as the Alucine (from Fleming's name for the genus, Aluco), and the latter as the Strigine section. The prevailing color of the plumage is brown, with a tinge of rusty-red, and it is exceedingly loose and soft, so that their flight (even in the larger species) is almost noiseless, enabling them to swoop upon their prey, which they hunt in the twilight. All owls cast up in the form of pellets the indigestible parts of the food swallowed. They range over the whole globe.

OWOSSO, a city in Shiawassee co., Mich.; on the Shiawasse river, and on the Michigan Central, the Grand Trunk, and the Ann Arbor railroads; 38 miles S. W. of Saginaw. It contains libraries, waterworks, street railroad and electric light plants, several banks, and a number of daily and weekly newspapers. It has manufactories of door and window screens, hickory handles, caskets, furniture and dining-room tables, rugs, newspapers and books. Pop. (1910) 9,639; (1920) 12,575.

OX, the castrated male of *Bos taurus* when arrived at maturity; also the popular name for the genus *Bos*. It has been known from remote antiquity, and in the East possessed, and in India still possesses, a sacred character. They have been broadly divided into two groups—the humped, with *B. Indicus*, and the straight-backed, with *B. taurus* as a type. The domestic oxen consist of a number of different breeds.

OXALIC ACID, in chemistry,

$$\left\{\begin{matrix}\mathrm{CO.HO}\\ \mathrm{CO.HO}\end{matrix}\right. + 2\mathrm{H_2O},$$

a dibasic acid existing ready formed in plants, and produced by the simple oxidation of glycollic alcohol, or by acting on starch, sugar, or cellulose, with nitric acid, or fusion with caustic alkali. It is formed commercially by fusing sawdust with a mixture of soda and potash to 204°, decomposing the oxalate with lime, and the lime salt with sulphuric acid, and afterward recrystallizing. The solution has a strong acid reaction, and is highly poisonous. The antidote is chalk or magnesia.

OXALIDACEÆ, the oxalid or wood-sorrel family, an order of plants, alliance Geraniales. They are herbs, undershrubs, or trees, generally distributed throughout both the hot and the temperate regions of the globe; the shrubby species, however, are almost confined to the tropics. They are chiefly remarkable for their acid juice, containing binoxalate of potash. The order contains six genera and 325 species.

OXALIS, in botany, wood-sŏrrel; the typical genus of the *Oxalideæ* or *Oxalidaceæ*. Known species, 220; chiefly from South Africa and South America. *O. acetosella* is the common wood-sorrel. The leaves are all radical and trifoliate; handsome white flowers, with purplish veins. Found in woods and other shady places, and in nooks on mountain sides. *O. corniculata* is the yellow prominent wood-sorrel. *O. stricta*, possibly only a sub-species of the last. The stalks of *O. crenata*, a Columbian species, are very acid, and make good preserve. *O. esculenta, O. deppei, O. crassicaulis*, and *O. tetraphylla* have eatable tubers. *O. sensitiva, O. stricta*, and *O. biophytum* have sensitive leaves. Those of *O. sensitiva* are tonic and slightly stimulating.

OXALURIA, a morbid condition of the system, in which one of the most prominent symptoms is the persistent occurrence of crystals of oxalate of lime in the urine. Persons who secrete this form of urine are usually dyspeptic, hypochondriacal, and liable to attacks of boils, cutaneous eruptions, and neuralgia.

OXENFORD, JOHN, an English dramatist and critic; born in Camberwell, England, in 1812, and was originally educated for the bar, but early turned to a life of letters, made himself familiar with French, German, and Spanish literature and translated Goethe's "Autobiography," and Eckermann's "Conversations with Goethe." For his last 30 years he was dramatic critic for the "Times." His "Illustrated Book of French Songs" (1855) showed a dexterous mastery of the lighter forms of verse. He wrote many plays, among them the "Dice of Death," the "Reigning Favorite," the "Two Orphans," as well as the libretto for "The Lily of Killarney," and one farce at least, "Twice Killed," that became widely popular. He died in London, Feb. 21, 1877.

OXENHAM, HENRY NUTCOMBE, an English theologian; born in Harrow, England, Nov. 15, 1829; and educated at Balliol College, Oxford, taking a classical second class in 1850. He took orders in 1854, and held various curacies, but entered the Roman Catholic Church in 1857, and was successively professor at

St. Edmund's College, Ware, and master at the Oratory School, Birmingham. Oxenham translated Döllinger's "First Age of the Church" (1866), and "Lectures on Reunion of the Churches" (1872), also vol. ii. of Hefele's "History of the Councils of the Church" (1876); "Catholic Eschatalogy and Universalism" (1876); "Short Studies in Ecclesiastical History and Biography" (1884); and "Short Studies, Ethical and Religious" (1885). He died March 23, 1888.

OXENHAM, JOHN. English novelist. He was born in Manchester, Lancashire, and educated at Victoria University in that city, acting first as a clerk and later as a commercial traveler, reresenting English firms in continental Europe and the United States. His first efforts at novel writing were in the interests of business. His works include: "God's Prisoner"; "Bondman Free"; "Barbe of Grand Bayou"; "Hearts in Exile"; "Carette of Sark"; "Pearl of Pearl Island"; "A Maid of the Silver Sea"; "The Coil of Carne"; "Red Wrath"; "Broken Shackles."

OXENSTJERNA, AXEL, COUNT, a Swedish statesmen; born in Fanö, Sweden, June 16, 1583, studied theology at

COUNT AXEL OXENSTJERNA

Rostock, Wittenberg, and Jena; and in 1609 returned to Sweden and entered the service of Charles IX. In 1608 he was admitted into the senate; and on the accession of Gustavus Adolphus, in 1611, was made chancellor. He accompanied Gustavus Adolphus during his campaigns in Germany; and on the fall of his master at Lützen (1632) was recognized, at a congress assembled at Heilbronn, as the head of the Protestant League. This league was held together and supported solely by his influence and wisdom, and in 1636 he returned to Sweden, laid down his extraordinary powers, and took his seat in the senate as chancellor of the kingdom and one of the five guardians of the queen. He died in Stockholm, Aug. 28, 1654.

OXFORD, a city and county borough in England; capital of Oxford co., and seat of one of the most celebrated universities in the world; about 50 miles W. N. W. of London, on a gentle acclivity between the Cherwell and the Thames, here called the Isis. Oxford, as a city of towers and spires of fine collegiate buildings old and new, of gardens, groves, and avenues of trees, is unique in England. The oldest building is the castle keep, built in the time of William the Conqueror, and still all but entire. Of the numerous churches the first place is due to the cathedral, begun about 1160, and chiefly in the late Norman style. It not only serves as the cathedral of Oxford diocese, but also forms part of the collegiate buildings of Christ Church. Other churches are St. Mary's, used as the University Church, with a noteworthy tower and spire (dating about 1400), St. Philip and St. James', a striking example of modern Gothic; All Saints' (18th century), with a Græco-Gothic spire; St. Giles' (12th and 13th century); St. Barnabas, a fine modern building. Of the university buildings the most remarkable are Christ Church; Magdalen College, considered to be the most beautiful and complete of all; Balliol College, with a modern front (1867–1869) and a modern Gothic chapel; Brasenose College; and New College (more than 500 years old), besides the Sheldonian Theater, Bodleian Library, Radcliffe Library, and other buildings belonging to the university. Pop. estimated (1918) 53,108.

OXFORD CLAY, in geology, a bed of clay, sometimes 600 feet thick, underlying the Coral Rag, and the accompanying sandy beds of the Middle Oölite. Corals are absent, but Ammonites and Belemnites abound. Remains of Ichthyosaurus, Plesiosaurus, etc., are also found.

OXFORD, EARL OF. See WALPOLE.

OXFORD, UNIVERSITY OF, an English university that lays claim to great antiquity, tradition assigning its foundation to King Alfred in 879. The earliest charter was granted by King John, and its privileges were confirmed and extended by subsequent monarchs, the act by which it was created a corporate

body having been passed during the reign of Elizabeth in 1570. The number of colleges established are 21, viz.:— University (founded, 1249); Balliol (1263); Merton (1274); Exeter (1314); Oriel (1326); Queen's (1340); New (1379); Lincoln (1427); All Soul's (1437); Magdalen (1458); Brasenose (1509); Corpus Christi (1516); Christ Church (1526); Trinity (1554); St. John's (1555); Jesus (1571); Wadham (1610); Pembroke (1624); Worcester (1714); Keble (1870); and Hertford (1874). There are colleges, not incorporated, viz.: Magdalen, St. Edmund's, St. Mary's, New Inn, and St. Alban's. Attached to the university is the Bodleian Library, founded by Sir Thomas Bodley, containing about 500,000 printed volumes, and more than 30,000 valuable MSS. Practically the entire student body volunteered for service in the World War, and the university was used for war activities of many sorts.

OXFORDSHIRE, co. of England, divided from Berkshire by the River Thames, and adjoining Gloucestershire, and the counties of Warwick, Northampton, and Buckingham. The area, which totals 751 square miles, is divided outside the towns between forest, agriculture and pasture land, this last predominating. The social life is centered at Oxford, which is the capital. Dairy farming is one of the industries, and the manufactures include shoes, gloves, blankets and farming utensils. Pop. about 200,000.

OXIDATION, in chemistry, the chemical change which gives rise to the formation of oxides, and which is brought about by the action of oxygen acids, water, or free oxygen.

OXIDE, the product of the combination of oxygen with a metal or metalloid.

OXLIP, in botany, *Primula elatior;* resembles the cowslip, but has the calyx teeth accuminate, the corolla pale yellow instead of buff, the limb concave, the throat without folds.

OXUS, AMOO, AMOO-DARIA, or **JIHOON**, a large river in Central Asia, which has its sources between the Thian Shan and Hindu Kush ranges in the elevated region known as the Pamir, flows W. through a broad valley, receiving many affluents, and N. W. through the deserts of W. Turkestan, bordering on or belonging to Bokhara and Khiva, to the S. extremity of the Sea of Aral, where it forms an extensive marshy delta. The principal head-stream of the Oxus is by some considered to be the Panja river, which rises in a lake of the Great Pamir, at a height of 13,900 feet. The Oxus for a considerable distance forms the boundary between Afghanistan and Bokhara. Total course, 1,300 miles.

OXYGEN, in chemistry, symbol O; at. wt. 16; a dyad element existing in the free state in the atmosphere, and in combination in the ocean. It forms about one-fifth of the former and eight-ninths of the latter. It is also present in the great majority of substances forming the earth's crust, and is the most abundant of all the elements. It was discovered in 1774 by Scheele in Sweden and Priestley in England independently, but the name was given by Lavoisier some time after. It can be obtained pure by heating black oxide of manganese, or a mixture of this oxide with potassic chlorate in a retort, and collecting the gas over water. When pure it is without color, taste, or smell. It is the sustaining principle of animal life and of the ordinary phenomena of combustion. Under the influence of cold and high pressure it has been reduced to the liquid state.

OXYHYDROGEN BLOWPIPE. An apparatus in which hydrogen is burnt in a stream of pure oxygen. When hydrogen burns in air or oxygen, water is produced. When combustion takes place in pure oxygen, a very high temperature results, stated by Bunsen to be 2,844° C. This temperature is capable of fusing highly refractory substances, and even of bringing platinum to the boiling point. The original "limelight" was produced by directing an oxyhydrogen flame against lime. For industrial uses, the oxyhydrogen blowpipe has been almost entirely superseded by the oxyacetylene burner, which depends on similar principles, acetylene being substituted for hydrogen.

OXYRHYNCHUS, a celebrated Egyptian fish, sacred to the goddess Athor, and represented in sculptures and on coins. It was anciently embalmed.

OYAMA, IWAO, PRINCE. A Japanese general. He was born in 1842 at Kagoshima, and studied the military art in Europe, supporting the throne in the rebellion of 1877. In 1885 he became minister with war portfolio in the Japanese cabinet and commanded the Second Army in the China War. He was made field-marshal in 1898, and in the war with Russia was commander-in-chief of the Japanese forces that fought at Shoho and Mukden. Oyama was in

Europe during the Franco-German War, and he had made a thorough study of Moltke's methods, and these methods he applied with entire success both at Liao-Yang and Mukden. He was made prince in 1907.

OYER AND TERMINER, the name of courts of criminal jurisdiction in the United States, generally held at the same time with the court of quarter sessions, and by the same judges, and which have power, as the terms imply, to hear and determine all treasons, felonies, and misdemeanors committed within their jurisdiction.

OYSTER, a well-known edible shell fish, belonging to the genus *ostrea*, occurring in most parts of the world. The European oyster (*O. edulis*), which forms a considerable article of trade on the coasts of England and France, is taken by dredging, after which the animals are placed in pits formed for the purpose, furnished with sluices, through which, at spring tides, the water is suffered to flow. In these receptacles they acquire the green tinge so remarkable in the European oyster, and which is considered as adding to their value. The breeding time of oysters is in April or May, from which time to July or August, the oysters are said to be "sick," or "in the milk." This is known by the appearance of a milky substance in the gills. Oysters attain a size fit for the table in about a year and a half, and are in their prime at three years of age.

From the observations and experiments of naturalists, it appears that they can move from place to place by suddenly closing their shells, and thus ejecting the water contained between them with sufficient force to throw themselves backward, or in a lateral direction.

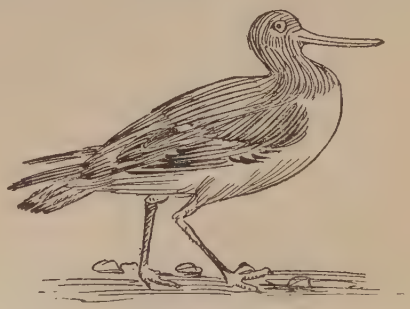
The lime obtained from the calcination of oyster shells, though exceedingly pure and white, is suited for work which does not require great tenacity, as for plastering rooms.

The oysters most esteemed in the United States are the Virginian oyster (*O. Virginiana*) and the Northern oyster (*O. borealis.*) The flats in the vicinity of maritime cities are generally thickly beset with poles, indicating the localities of oyster beds. The principal sources of supply are the Chesapeake Bay, the coast of New Jersey, and Long Island Sound.

Formerly the oyster beds were almost wholly kept up by restocking them with seed oysters from Chesapeake Bay and from the Hudson river; but of late years the spat is secured at spawning time, and new ground in the vicinity is brought under cultivation, till the area of oyster beds in Long Island Sound is now computed by miles rather than by acres, and it is yearly extending.

Law as to Oysters.—The rule is that he who has the right of property in the soil or seashore is entitled to catch or keep a bed of oysters there. Whoever steals oysters or oyster-brood from an oyster-bed which is private property is guilty of felony; and whoever unlawfully or willfully uses any dredge, net, or instrument within the limits of a private oyster-bed, for the purpose of taking oysters, though none are actually taken, is guilty of a misdemeanor. In the United States there are various laws for the protection of the oyster industry, and applicable to various states, those relating to Virginia and New Jersey, being the most specific and strict.

OYSTER CATCHER, in ornithology, *Hæmatopus ostralegus*, a handsome European bird, about 16 inches long, common on flat, sandy coasts. The head, neck, throat, scapularies, quill feathers, and latter half of the tail feathers are deep glossy black, the rest of the plumage pure white. The bill, about three inches long, is a rich ruddy color, deepest at the



OYSTER CATCHER

base; very much compressed, with a wedge-like termination. Oyster catcher is a misnomer, for the bird feeds mostly on mussels and limpets, though it frequently takes to the water in search of food. The bird seems to lay its head sideways on the ground, and then, grasping the limpet's shell close to the rock between the mandibles, uses them as scissor-blades to cut off the mollusk from its sticking place. Also any of the several American species of wading birds of the genus *Hæmatopus*.

OZARK MOUNTAINS, a chain of the United States, intersecting in a S. W. direction the States of Missouri and Arkansas; height about 1,400 feet.

OZOKERITE. Mineral wax; fossil wax. A naturally occurring, wax-like hydrocarbon mixture, brownish to black or green in color. Specific gravity 0·85 to 0·97. Melting point 55–110° C. Insoluble in water, but soluble in all common solvents of fats and oils. Found in veins in Galicia, Utah, Wyoming, in the Caucasus and in other parts. Its formation is believed to have been brought about by the oxidation and decomposition of the hydrocarbons of naphtha. Ozokerite is purified by treatment with concentrated sulphuric acid and filtration through charcoal, and yields, by this treatment, a white waxy substance known as *cerasin*, used in the manufacture of candles. The chief uses of ozokerite are in electric insulation, the manufacture of paints, leather polish, sealing wax and ink, as a filling for rubber and in the preparation of carbon papers.

OZONE, in chemistry, a modification of oxygen existing as a triatomic molecule. It is nearly always present in the atmosphere, apparently as the result of electrical action, and is formed by passing electric sparks into dry air. It possesses a peculiar, almost metallic, odor, and seems to have all the properties of oxygen, in an enhanced degree.

P

P, p, the 16th letter and the 12th consonant of the English alphabet is a labial sound, formed by a compression of the anterior part of the lips, as in pull, papa, ap. As a sharp labial it is classed with f, and corresponds to the flat labial b. P has but one sound in English, except when in combination with h it forms the digraph ph, which is sounded as f, and occurs in words derived from the Greek. In the case of many words derived from the Greek, initial p is not sounded, as in pneumatics, psalm, psalter, pterodactyl. It is sometimes, but rarely, silent in the middle of a word, as in receipt. P represents the Latin *post* = after; as p. m.= *post meridiem* = after noon; p. s.= postscript, etc.; in music for piano = softly.

As a symbol, P was formerly used: In numerals: To denote 400, and with a dash over it, to denote 400,000.

PACAGUARAS, an Indian tribe living in the N. parts of Bolivia and Brazil. They have numerous small villages and follow hunting and fishing for a livelihood. Some of them formerly embraced the Christian religion. There is but a remnant of the tribe remaining.

PACAY, a Peruvian tree (*Prosopis dulcis*), natural order *Leguminosæ*, suborder *Mimosæ*. The pure white, flaky matter in which the seeds are embedded is used as food, and the pods, which are nearly two feet long, serve for feeding cattle. The mesquite belongs to the same genus.

PACHACAMA, a town and temple of ancient Peru, on the coast, about 20 miles S. of Lima. In this temple worship was paid to Pachacama, the Supreme Deity, or "founder of the world." The ruins of the building, are of an older type of architecture than that of the Incas. The shrine and wooden image of the god were destroyed by Pizarro in 1523.

PACHIRA, in botany, a genus of *Bombaceæ*, akin to Adansonia. P. (*Carolinea*) *alba* is a South American tree, the inner bark of which furnishes excellent cordage. *P. macrantha* is a large tree, 100 feet high, with greenish flowers and blood-red filaments.

PACHMANN, VLADIMIR DE, a Russian pianist; born in Odessa, Russia, July 27, 1848. He studied under his father, who was a violinist of some talent, and was also a pupil of Dachs at Vienna. His first appearance was in 1869, and in 1871 he began his tours. He visited Paris, Vienna and London (1882-1883) and was received with enthusiasm. He came to the United States and toured the country in 1899–1900. He became famous here and in Europe especially for his interpretations of Chopin.

PACHYDERMATA, an order of Mammalia, founded by Cuvier, for hoofed non-ruminant animals with thick integuments. He divided it into three groups, Proboscidea, Ordinaria, and Solidungula. The first division is now raised to ordinal rank, and contains the elephants; the others are grouped in one order, *Ungulata*. To these two orders Professor Huxley has provisionally added a third, *Hyracoidea*.

PACIFIC OCEAN, the largest of the five great oceans, lying between America on the E., and Asia, Malaysia, and Australasia on the W. The name "Pacific," was given to it by Magellan, the first European navigator who traversed its expanse. The greatest length of the Pacific Ocean from the Arctic (at Bering Strait) to the Antarctic circles is 9,200 miles, and its greatest width, along the parallel of lat. 5° N., about 10,300 miles; while its area may be roughly estimated at about two-fifths of the whole surface of the earth. The deepest sounding yet found in the Pacific Ocean is 26,850 feet, or about 5 miles—nearly equal to

the height of the highest mountain on the globe. The coasts of the Pacific Ocean present a general resemblance to those of the Atlantic, and the similarity in the outline of the W. coasts of each is even striking, especially N. of the equator; but the shores of the former, unlike those of the latter, are sinuous, and, excepting the N. E. coast of Asia, little indented with inlets. The shore on the American side is bold and rocky, while that of Asia varies much in character. Though the Pacific Ocean is by far the largest of the five great oceans the proportion of land drained into it is comparatively insignificant. Its basin includes only the narrow strip of the American continent to the W. of the Andes and Rocky Mountains; Melanesia, which contains few rivers, and none of them of large size; the Indo-Chinese States, China proper, with the E. part of Mongolia, and Manchuria in the Asiatic continent.

In Polynesia, especially near the New Hebrides group, hurricanes are of frequent occurrence from November to April. On the coast of Patagonia, and at Cape Horn, W. winds prevail during the greater part of the year, while in the sea of Okhotsk they are of rare occurrence. The frightful typhoon is the terror of mariners in the Chinese seas, and may occur at all seasons of the year. The currents of the Pacific Ocean, though less marked in character and effects than those of the Atlantic, are yet of sufficient importance to require a brief notice. The southern Pacific current takes its rise S. of Van Dieman's Land, and flows E. at the rate of half a mile per hour, dividing into two branches about lon. 98° W., the N. branch, or Current of Mentor, turning N. and gradually losing itself in the counter Equatorial Current; the S. branch continuing its E. course till it is subdivided by the opposition of Cape Horn into two branches, one of which, the cold Current of Peru, or Humboldt's Current, advances N. along the W. coast of South America, becoming finally absorbed in the Equatorial Current; the other washing the coast of Brazil, and becoming an Atlantic current. The existence of this ocean first became known to Europeans through Columbus, who had received accounts of it from some of the natives of America, though it was first seen by Balboa, Sept. 29, 1513, and first traversed by Magellan eight years afterward.

PACIFIC RAILROADS, a general name given to all the railroads connecting the Pacific coast of the United States with other parts of the country, to which the aid of the National government was given in their construction. In 1862 an act was passed, granting to the companies five sections of public land and $16,000 in government bonds for every mile constructed, the land and bonds for every stretch of 40 miles to be turned over to the company only on the completion of such stretch. The Union Pacific railroad was built W. over the mountains, and the Central Pacific railroad was built E. from Sacramento. These two lines were joined, with impressive ceremonies, at Promontory Point, Utah, May 10, 1869. The last tie, of laurel wood, with a plate of silver upon it, was laid, and the last spike, made of iron, silver, and gold, was driven in the presence of distinguished men. Telegraph wires were attached to the last rail, and the last blows were signaled upon bells in Washington and other large cities.

In May, 1878, an act, known as the Thurman Act, was passed. In addition to the amounts retained out of sums due for government service, the Act of 1862 provided for the payment of 5 per cent. of the net earnings of the company. The Act of 1878 retained the entire amount due to the companies for government service, one-half to be applied to interest payments, one-half to form a sinking fund for the principal, and it required, moreover, the annual payment of a fixed sum ($850,000 for the Union Pacific and $1,200,000 for the Central Pacific). See RAILWAYS.

PACIFIC UNIVERSITY, a coeducational institution in Forest Grove, Ore.; founded in 1853 under the auspices of the Congregational Church; reported at the close of 1919: Professors and instructors, 12; students, 150; Dean, R. F. Clark, A.M.

PACIFIC UNIVERSITY, a coeducational institution in San José, Cal., founded in 1852 under the auspices of the Methodist Episcopal Church; reported in 1919: 34 instructors; 465 students; President, J. L. Seaton, Ph. D.

PACINIAN BODIES, or **PACINIAN CORPUSCLES**, certain corpuscles appended to the nerves; first noticed by Pacini in 1830 and 1835, and described by him in 1840. In the human subject they are found in great numbers in connection with the nerves of the hand and foot, the nerves, as it may be presumed, of touch; but they also exist sparingly on other spinal nerves, and on the plexuses of the sympathetic, though never on the nerves of motion.

PACKARD, ALPHEUS SPRING, an American naturalist; born in Brunswick, Me., Feb. 19, 1839; graduated at Bowdoin 1861; for a time assistant to Agassiz at Cambridge. State Entomologist of Massachusetts in 1871–1873. In 1878 Professor of Zoölogy and Geology at Brown University. He is best known as an entomologist; his classification of insects, 1863, has been generally accepted. As an evolutionist, Professor Packard was one of the leaders of the Neo-Lamarckian school. His writings include "Structure of the Ovipositor of Insects" (1868); "Development and Anatomy of Limulus Polyphemus (1871–1885); "The Cave Fauna of North America" (1888); "The Labrador Coast" (1891); "Text-book of Entomology" (1898); "Lamark" (1891); monographs on geometrid moths, a locust's brain, phyllopod crustacea, etc. He died in 1905.

PACKARD, FRANK LUCIUS, an American writer, born in Montreal, Canada, in 1877. He graduated from McGill University in 1897, and took post-graduate courses in Europe. For several years he was engaged in engineering and in 1906 began contributing to magazines. He was the author of "On the Iron at Big Cloud," (1911); "The Miracle Man," (1914); "The Beloved Traitor," (1916); "The Sin That Was His," (1917). He also contributed many stories to magazines.

PACKER COLLEGIATE INSTITUTE. A girls' school in Brooklyn, N. Y., built in 1853 to succeed the Brooklyn Female Academy, the buildings of which were destroyed by fire in the preceding year. Mrs. Harriet L. Packer endowed the new institution with $65,000. The courses now given provide primary, secondary, high school, and collegiate instruction. The enrollment in all departments in the year 1914–1915 was 641. The total value of the buildings and equipment of the institute is approximately $600,000. The library is an unusually large one for schools of this type, having 11,000 volumes.

PACKFONG, a Chinese alloy of a silver-white color, consisting of copper, zinc, nickel, and iron. It was formerly used by watch makers, mathematical instrument makers, and others, for a variety of purposes for which nickel alloys are now employed.

PACKING INDUSTRY. The packing industry involves the purchase of live stock, the conversion of live stock into saleable products, and the distribution of those products. In the last fifty years the packing industry has come to be one of the most important industries in many American cities, especially in the middle West. The history of the industry begins in New England in the 17th century, when quantities of pork and beef were packed in barrels for foreign trade. The first packing house in the West was established in Cincinnati in 1818, and that city remained the center of the packing trade for nearly fifty years, when Chicago surpassed it. The tremendous and rapid growth of the meat packing business is due to the invention of the refrigerator car in 1868 by William Davis of Detroit. Before that time meat had to be killed near the point of consumption, and the packing industry was largely confined to the production of barreled beef, and the curing of pork products in winter. Even the canning of meats is a fairly recent development. In the slaughtering of animals a great many labor saving devices are used, and there is now a very fine division of labor in the enormous stock yards and packing houses of Chicago, and the other large cities. The animals are first stunned by a severe blow on the head, then killed and bled, after which they are passed through scalding vats and through an automatic scraper which removes the hair and bristles. As soon as the carcasses have been dressed and thoroughly inspected, they are chilled by refrigeration, which is the basis of all successful meat curing. The meat is shipped to Eastern markets in refrigerated cars owned by the packing companies, and placed in cold storage warehouses to be sold to local dealers, or transferred to iced rooms in the ocean liners to be delivered in Liverpool or Glasgow.

Originally little or no use was made of the so-called waste products of animals, but the packers have shown great ingenuity in their use of the by-products. In addition to the sale of the carcasses of cattle, sheep and hogs, the packing industry now includes the making of glue from the hoofs, horns and bones, leather from the hides, brushes from the hog bristles, fertilizer from the meat scraps, soaps, tallow from the fats, pepsin from the stomach, and lard, one of the most valuable and profitable by-products. Two grades of lard are made; steam lard, and the more refined leaf lard. In dressing hogs, nearly 20 per cent. is waste, or is used for glue or fertilizer. The most profitable part of the industry is the making of sausages. The meat used for this purpose is for the most part trimmings. The meat is chopped, mixed with potato flour and

water, spiced, and stuffed by machinery into the intestines which are used for sausage casings after they have been thoroughly cleaned by machinery. In dressing cattle, the parts to be sold as fresh beef are allowed to cool for forty-eight hours, and then shipped. The poorer grades of beef are used for canning, which is becoming a more important division of the industry than it was formerly.

In 1906 a Federal Meat Inspection Law was passed, requiring several inspections of the animals by expert veterinarians before slaughtering, and again during the processes of slaughtering and curing. Before that time there had been inadequate protection against tainted meats, though there had been government supervision of the industry since 1891.

There has been a growing tendency in the United States to concentrate the industry in the hands of a few companies, controlled by a small group of men. As early as 1890 the four largest packing concerns entered into an agreement not to enter into competition with one another. The danger of such a monopoly of the food supply was soon evident to the government, and in 1902 an investigation of the industry was made by the Department of Justice, and the Supreme Court of the United States issued an injunction restraining the packers from conducting their business in violation of the Sherman Anti-Trust Act of 1890. This injunction, however, did not seem to change the policy of the packers but rather forced them to resort to guarded methods of controlling the food supply of the country. In the past ten years there have been frequent Congressional Committees appointed to investigate the packing industry, and the magazines and papers have contained countless articles on the subject. In June, 1919, the Federal Trade Commission made a detailed report of the business conducted by "The Big Five" packers, Armour & Co., Swift & Co., Libby, Wilson and Cudahy. This report stated, among other charges, that the Big Five had secured control of the meat supply of the country, that they had unfairly used this control to keep up prices, to crush competition, and to secure special privileges from the railroads, and to demand excessive profits harmful both to the consumer and to the producer. The Commission recommended government requisition of (1) rolling stock used for the transportation of animals, (2) the principal stock yards of the country, (3) all the privately owned refrigerating cars, (4) marketing and storage facilities. In December, 1919, Attorney General Palmer announced that the packers had agreed to retire from all business except meat packing and distribution of dairy products, to sell all their holdings in the large public stock yards, and in stock-yard newspapers, to abandon the use of countless branch warehouses, all over the country, and to disassociate themselves from the retail meat business, which they had formerly controlled, as well as many of the chain stores. However, this agreement of the packers did not immediately result in the lowering of prices, and in 1920 a number of bills were introduced into Congress in an endeavor to restrain the monopoly of the Big Five. Chief among these were bills backed by the farmers of Kansas. The chief centers in which the packing industry is conducted in the United States are Chicago, Omaha, Milwaukee, St. Louis, Kansas City, Cincinnati, and New York. The foreign trade of the packers is greatly increasing with the improved facilities for refrigeration in trains and steamships.

The latest available figures are from the United States census of 1914, and give 1,279 slaughtering establishments, with a capital of $534,274,000 and products valued at $1,651,965,000. Chicago heads the list of centers of the industry with 24 per cent. of the business done.

PACTOLUS, anciently the name of a small brook of Lydia, in Asia Minor, which rises on the N. slope of Mount Tmolus (modern Buz Dagh) flows N. past Sardis (Sart), and empties itself into the Hermus (Kodus). It is never more than 10 feet broad and 1 foot deep. The sands or mud of Pactolus were long famous in antiquity for the particles of gold dust which they contained. The brook is now called Sarabat.

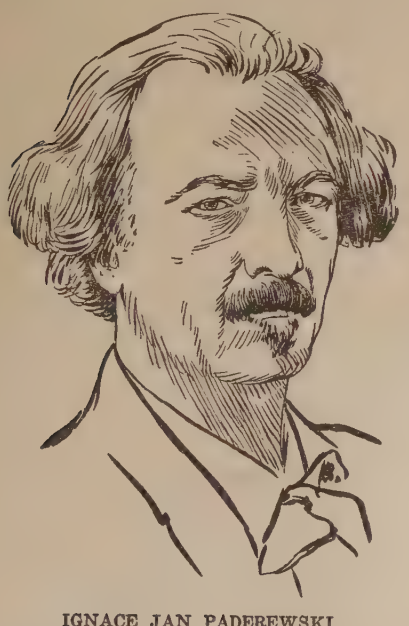
PADDLE FISH, the *Polyodon spatula*, a large fish allied to the sturgeons, so named from the elongated broad snout with which it stirs up the soft muddy bottom in search of food. It often reaches a length of from 5 to 6 feet. The paddle fishes are exclusively North American in their distribution, being found in the Mississippi, Ohio, and other great rivers of that continent.

PADELFORD, FREDERICK MORGAN, an American educator, born at Haverhill, Mass., in 1875. Graduated from Colby College in 1896 and took post-graduate courses at Yale and in Europe. From 1899 he was professor of English at the University of Idaho

and in the year 1901 he became professor of English at the University of Washington. He wrote and translated many works relating to English and other literature. He was a contributor to the Cambridge History of English Literature and to European and English magazines.

PADERBORN, a town of Westphalia, Prussia; 50 miles S. W. of Hanover. The fine Romanesque cathedral (R. C.), completed in 1163, is built over the sources of the Pader, and contains the silver coffin of St. Liborius. Notable edifices are St. Bartholomew's Chapel (1017) and the town house (1615; restored 1870–1876). The old Hanse town was sacked by the Duke of Brunswick in 1622, and it suffered much during the Thirty Years' War. From 1614 to 1819 it was the seat of a Roman Catholic university. Much of it was burnt down in 1875.

PADEREWSKI, IGNACE JAN, a Russian pianist; born in Podolia, Russian Poland, Nov. 6, 1860. At seven his father placed him under the care of a teacher, Pierre Sowinski. In 1872 he



IGNACE JAN PADEREWSKI

went to Warsaw, where his knowledge of harmony and counterpoint was acquired from Roguski, and later from Frederick Kiel, of Berlin. At 18 he was nominated Professor of Music to the Warsaw Conservatory. In 1884 he held a professorship at the Conservatory of Music in Strassburg, but he resolved to become a pianistic virtuoso. He removed to Vienna, placed himself under Leschetizky, and made his début before the Viennese public in 1887, and was at once proclaimed to be one of the most remarkable pianists of the day. He paid several visits to the principal towns throughout Germany, always with increasing success, and in 1889 made his first appearance before a Parisian audience. He visited the United States four times. He composed more than 80 vocal works, a concerto in A minor for piano and orchestra, an opera "Manfred," a suite for orchestra in G, and many pieces for the piano. His "Polish Fantasie" was produced at the Norwich Festival in 1893.

In 1900 he established the Paderewski Fund in the United States for the encouragement of American composers. In the first competition (1902) three prizes of $500 were awarded to Henry Hadley, Horatio Parker and Arthur Bird. Only one award, to Arthur Shepherd, was made in 1906. Paderewski married Madame Gorski in 1899. During the World War he was busy pressing the claims of Poland as a nation and raising money for his suffering countrymen. He was appointed Premier of the Polish Republic 1919, and resigned in 1920.

PADGETT, LEMUEL P., member of the House of Representatives from the 7th Tennessee district. Born in Columbia, Tenn., 1855, graduated from Erskine College, South Carolina, 1876. Three years later he began the practice of law at Columbia. From 1898–1900 he was a member of the Tennessee State Senate and in 1901 was elected to Congress, since that time he has been re-elected for every term. When the Democratic party obtained a majority in the House in 1911 Congressman Padgett became Chairman of the Committee on Naval Affairs, and directed the Committee's action during the war with Germany. Since December, 1917, he was a regent of the Smithsonian Institution.

PADUA (ancient Patavium), a fortified city and province of Italy (Padova). Its celebrated university, founded in the 13th century, had formerly students from all parts of the world. Among these were Dante, Petrarch, and Tasso; and among the professors Fallopius, Fabricius ab Aquapendente, Morgagni, Galileo, and Guglielmini. The university library comprises 100,000 volumes. There is also an academy of sciences. The churches, and especially San An-

tonio, are less remarkable for architecture than for their paintings and interior decorations. Manufactures woolens, silks, ribbons, and leather. Pop. province about 575,000; city, about 120,000.

PADUCAH, a city and county-seat of McCracken co., Ky.; at the confluence of the Ohio and Tennessee rivers, and on the Nashville, Chattanooga, and St. Louis, the Illinois Central and the Chicago, Burlington and Quincy railroads; 48 miles N. E. of Cairo, Ill. It contains a court house, high school, United States Government Building, the Illinois Central Railroad Hospital, waterworks, electric light and street railroad plants, National and State banks, and several daily and weekly newspapers. There are manufactories of chairs, furniture, tobacco, farming implements, etc. It also has a shipbuilding plant, tobacco warehouses, and tobacco factories. Pop. (1910) 22,760; (1920) 24,735.

PÆAN, in classical mythology, a name given to Apollo. Also the ancient choral song addressed to Apollo, named after its burden (Greek *io paian*). It was sung sometimes before battle, and sometimes after a victory. Also a song of triumph or rejoicing.

PAES, or **PAEZES**, an Indian tribe living in the mountains of Colombia. They were formerly a powerful, warlike tribe now reduced to about 2,000. They live in villages and follow agriculture and though inhabiting a cold region wear few clothes.

PÆSTUM, an ancient city of Lucania, in southern Italy, in the N. W. extremity of that province, about 4 miles S. E. from the mouth of the Silarus (Selo), and upon a bay of the Tyrrhenian Sea, called Sinus Pæstanus (now Gulf of Salerno). It was a place of importance and great beauty in the time of the Romans, and renowned for the splendid roses grown in its neighborhood, which bloomed twice a year.

PAEZ (pa-ēth′), **JOSÉ ANTONIO**, one of the founders of South American independence; born of Indian parents near Acarigua, Venezuela, in 1790. He entered the patriot army in 1810, rose to general of division in 1819, and took a leading part in the battle of Carabobo, which secured the independence of Colombia in 1821. At first he acted in concert with Bolivar, but in 1829 he placed himself at the head of the revolution which culminated in the independence of Venezuela, of which he was the first president. He spent the latter part of his life in the United States. He died in exile in New York, May 7, 1873.

TEMPLE OF CERES AT PÆSTUM

PAGAN (Latin, pagus = a village), a heathen, an idolater; one who worships idols or false gods (applied to one who is not a Christian, a Jew, or a Mohammedan). The last use of the word dates from the 4th century. Trench says that the first use of the word in this sense is in an edict of the Emperor Valentinian A. D. 368. When Christianity was first preached, the cities were quicker to embrace the faith than the

villages and the word *paganus* = a villager became synonymous with heathen.

PAGANINI, NICOLO, an Italian violist born in Genoa, 1784. His father was a distinguished musical amateur. From 1813, when he went to Milan, dates his marvelous performance on a single string which later amazed great audiences in Germany, France, and England. He realized large sums of money by his playing which were gambled away. His last years were spent at his villa near Parma. Died in Nice in 1840.

PAGANISM, the state or condition of a pagan; heathenism; the worship of idols or false gods, used specially of that of ancient Rome. In Germany the term is applied to tendencies in the Christian church, deemed polytheistic.

PAGE, a youth attached to the service of a royal or noble personage, rather for formality or show than for servitude. The name "pages" appears to have been confined to slaves and attendants of an inferior class, in modern Europe, till the reigns of Charles VI. and Charles VII. of France. As chivalric institutions prevailed, the office, by whatever name it may be called, became of importance. Courts and castles were the schools in which the young noble passed through the degree of page, in order to reach the higher grades of esquire and knight, when he became *hors de page.* Pages are still, or were until recently, in the household of the Queen of Great Britain, with the title of "Pages of the Presence" etc. The word is also applied to messenger boys in National, State, and municipal legislative bodies.

PAGE, CARROLL SMALLEY. United States Senator from Vermont. Born 1843 at Westfield, Vt. Educated at different New England academies, he entered business in Lamoille, Vt. He rapidly made headway and served as president of the Lamoille County Savings Bank and Trust Co., and was director in many important railroad and banking corporations. From 1869–1872 he was a member of the Vermont House of Representatives, and later of the State Senate. Prominent in the activities of the Republican party, he was Chairman of the Vermont delegation to the National Convention in 1912. From 1890 to 1892 he was Governor of Vermont. Senator Proctor of Vermont died in 1908 and Page was elected to fill his unexpired term. He was twice re-elected.

PAGE, CURTIS HIDDEN. An American editor and translator. He was born at Greenwood, Mo., in 1870, and graduated from Harvard as A. M. and Ph. D. in 1894. He then went to reside in France and Italy, and returned to teach the Romance languages and English at Western Reserve University, Harvard, Columbia, the Northwestern University and Dartmouth. He translated Bergerac's "A Voyage to the Moon"; Ronsard's "Songs and Sonnets"; "The Best Plays of Molière"; and Anatole France's "The Man Who Married a Dumb Wife." He has edited "Poet Lore," and some poetical reprints.

PAGE, HERMAN, an American Protestant Episcopal bishop, born in Boston in 1866. He graduated from Harvard in 1888 and studied in the Episcopal Theological School. He was ordained priest in 1891 and from that year to 1900 was in charge of mission churches in Idaho. In the latter year

THOMAS NELSON PAGE

he became rector of St. John's Church, Fall River, Mass. He was later rector of St. Paul's Church, Chicago. He was consecrated bishop of Spokane, Wash., in 1914.

PAGE, THOMAS NELSON, an American novelist; born in Oakland, Va., April 23, 1853. He was educated at Washington and Lee University, and practiced law at Richmond, Va. His

first story, "Marse Chan" (1887), attracted immediate attention. "Two Little Confederates" (1888); "On New-Found River" (1891); "Elsket and Other Stories" (1891); "The Old South" (1892); "Pastime Stories" (1894); "Unc' Edinburgh" (1895);

WALTER HINES PAGE

"Social Life in Old Virginia" (1897); "Santa Claus' Partner" (1899); "Gordon Keith" (1903); "Sword of the Spirit" (1913), etc. Appointed Ambassador to Italy 1913. He resigned his office in 1920, and was succeeded by R. U. Johnson.

PAGE, WALTER HINES. Editor and diplomat. Born in 1855 at Cary, N. C., and educated at Randolph-Macon College, Virginia. He entered newspaper work in 1880 as editor of a paper in St. Joseph (Mo.). Later he served on the editorial staff of the "New York World" and the "New York Evening Post." From 1890–1895 he was the editor of "The Forum," and later became editor of the "Atlantic Monthly" and the "World's Work." He was a member of the firm of Doubleday, Page, and Co. publishers, from 1899 until his death in 1918. In 1913 President Wilson appointed Page Ambassador to Great Britain, and both during the period of American neutrality and later participation he handled affairs with consummate ability and tact.

PAGEANTS AND CELEBRATIONS. The celebration of historic events by dramatic reproductions of scenes connected with them is at least as old as the Greeks and Romans. In modern times, in many countries of Europe, developments have been added to them according to the time and place, and carnivals, masques, popular parades, expositions, and military maneuvers are some of the exercises in vogue in different lands. In the United States the celebrations attendant on the commemoration of Independence Day led to the development of many of the elements in pageantry, and a great fillip to the movement was given during the celebration of the centennial of the Declaration of Independence in 1876.

The central idea of the pageant is simply that of the unspoken drama given on a larger scale out of doors, the predominating feature being that of a moving tableau in which a procession of characters take part. The scale is confined simply to the number of persons taking part, and the dress, bearing, manners, and grouping is in accordance with the period represented and the event commemorated. In France the art of the pageant has been carried to a high degree of perfection, and as a rule its frequency and success has been most marked in countries like France, Italy, and Spain where the climate is favorable to outdoor representations of that kind. From France the idea spread to Great Britain, where in recent years a succession of successful pageants have been given, despite the uncertainty of the English weather. Thus in 1905 an historical pageant on a scale surpassing that known to the modern generation of Englishmen was carried out with success at Dorset. The fashion spread throughout England, Ireland and Scotland, and since then many successful pageants have been given in those countries. The celebrations have usually been held on several days in a week, and the proceeds have been used for public purposes.

The equable climate of America has tended to the development of the pageant and historic tableaus have become the fashion, particularly at women's colleges, during the milder half of the year. In 1889 New York saw a national pageant reproducing "Dramatic Events in the History of New York." The carnivals of the Southern States have never been without their pictorial representations. At New York in 1914 was staged

a pageant of the various nationalities of America who exhibited their national costumes and sang historic songs. Tableaux of various kinds, in which large numbers of children take part, have become increasing features of centennial and similar celebrations. The Hudson-Fulton celebration of 1909, the Lake Erie celebration of 1913, and the Star-Spangled Banner celebration of 1914, had also numerous dramatic features, and were conducted on a scale unknown in Europe. The course of the World War, particularly after the United States had entered into it, led to numerous celebrations intended to excite the warlike ardor of the people. In 1920 the events connected with the canonization of St. Jeanne d'Arc gave occasion to pageants in New York and elsewhere reproducing episodes in the career of the girl-warrior and expressive of sympathy with France as chief sufferer in the World War.

PAGODA, the temple of an idol in India. They belong both to antiquity and modern times. Some are wonderfully large and magnificent. They consist of one or more quadrangular courts with towers at the corners, surrounded by a wall. Large pyramids rising in stages cover the entrance, behind which extend colonnades. Inside the courts are lustral pools, colonnades, and large halls, called Tschultris, which are used to lodge pilgrims in. Small side temples appear with cupolas surmounting the accessory buildings. Behind the first court is often a second and a third, in which, finally, the chief temple stands. The most celebrated is that of Juggernaut, in the island of Ramisseram, completed toward the end of the 12th century.

Also a coin of gold or silver, current in Hindustan, and varying in value in different localities from $2 to $2.25. Its value, when made of gold, by weight is equivalent to about $1.80 of American standard gold coinage.

PAGO PAGO, a harbor in the island of Tutuila, Samoa. It is a long L-shaped expanse of water, extending mostly in an E. and W. direction, and surrounded by tall, almost precipitous cliffs, that run up into peaks from 2,000 to 3,000 feet high.

The harbor was ceded to the United States for a naval and coaling station, first in 1872, and afterward confirmed by a treaty signed in Washington, Jan. 17, 1878, and ratifications exchanged on Feb. 13 of the same year, by which the United States was given the right to establish at that harbor a station for coaling, naval supplies, freedom of trade, commercial treatment, etc. This harbor was occupied by the United States in 1898. Tutuila, the island on whose coast this harbor is located, has a population of about 6,000, area 77 square miles, while Upolu has an area of 340 square miles, and Savaii 659 square miles. The German and British governments withdrew their claims to this island in favor of the United States.

PAGUMA, a group of mammals, genus *Paradoxurus*, family *Viverridæ* (civets and genets), inhabiting eastern Asia. The peculiar masked paguma (*P. larvatus*) has a white streak down the forehead and nose, and a white circle round the eyes, which give it the appearance of wearing an artificial mask.

PAHANG, a state on the E. coast of the Malay Peninsula; area, 14,000 square miles, pop; about 85,000. By the treaty concluded between Great Britain and the Sultan of Pahang in 1888 the control of the foreign relations of that state was conveyed to the government of the Straits Settlements; and Pahang is now practically a dependency of that colony. In 1895 it was united with the Malay Federation. Capital, Kuala Lipis.

PAHLANPUR, or **PALANPUR**, a town of India, capital of a native state of the same name; 83 miles N. of Ahmadabad in Bombay presidency. Pop. about 20,000. The Pahlanpur agency comprises Pahlanpur and 12 other states in the N. of Bombay, with an area of 8,000 square miles, and pop. about 235,000.

PAIN, an uneasy sensation of body, resulting from particular impressions made on the extremities of the nerves transmitted to the brain. It is often of great service in aiding the physician at arriving at a correct diagnosis of a disease, and still more obviously in frequently being the only intimation which a patient has of the fact of there being a disease which demands a remedy.

PAINE, ALBERT BIGELOW. An American author. Born at New Bedford, Mass., in 1861. He became in 1899 the editor of a department in the "St. Nicholas Magazine," a position which he held for ten years. He is the author of numerous works, but perhaps is best known by his "Biography of Mark Twain," published in 1912. Later he wrote "The Boy's Life of Mark Twain" (1916) and "Mark Twain's Letters" (1917). He was a life-long friend of Twain, who appointed Paine his literary executor. The more important of his other works are "The Autobiography of

a Monkey" (1897); "The Commuters" (1904); "Thomas Nast—His Period and His Pictures" (1904).

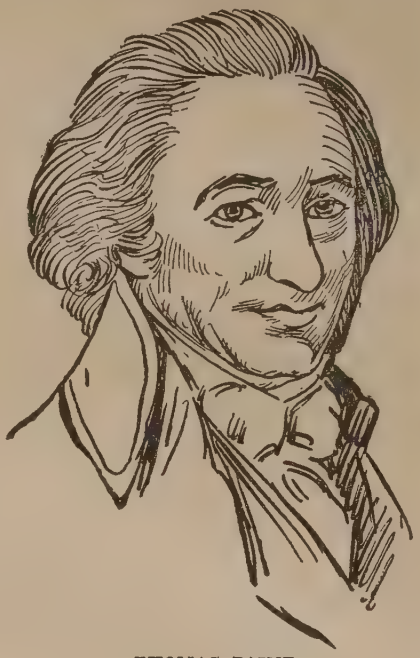
PAINE, JOHN KNOWLES, an American organist and composer; born in Portland, Me., Jan. 9, 1839; was Professor of Music from 1874 at Harvard College. His compositions are chiefly piano pieces, with a mass in D, an oratorio, "St. Peter," the "Œdipus Tyrannus" (incidental music for Sophocles' tragedy), the opera "Azara," Columbus march and hymn for the World's Columbian Exposition (1892), etc. He died April 25, 1906.

PAINE, RALPH DELAHAYE, an American writer, born at Lemont, Ill., in 1871. Graduated from Yale in 1894 and at once engaged in newspaper work, acting as correspondent during the Spanish-American War and in China during the Boxer uprising. He wrote many books, chiefly for boys, and was a contributor to periodicals and magazines.

PAINE, ROBERT TREAT, an American jurist, signer of the Declaration of Independence; born in Boston, Mass., March 11, 1731; was a delegate to provincial and continental congresses, and held offices of attorney-general of Massachusetts and judge of Supreme Court; was an able judge. He died in Boston, May 11, 1814.

PAINE, THOMAS, an American political writer; born in England, in 1737. At the outbreak of the Revolutionary War he, in 1774, emigrated to the United States; became editor of the "Pennsylvania Magazine," and gave an impulse to the Revolution by his famous pamphlet called "Common Sense," in which he advocated the policy of separation and independence. He went to Paris in 1789, and published, in 1791, his "Rights of Man," in reply to Burke's speech on the French Revolution. In September, 1792, he was elected a member of the French National Convention, acted with the Girondists, narrowly escaped death in the Reign of Terror, and brought out, in 1795, his celebrated deistical work entitled, "The Age of Reason." He returned to the United States in 1802, and died in New York, June 8, 1809.

PAINLEVÉ, PAUL, French statesman, born in Paris, 1863; educated in the École Normale Supérieure, where he especially distinguished himself in mathematics. After graduating, in 1886, he was sent by the Government on a confidential mission to Germany. On his return, the following year, he taught mechanics in the University of Lille, where he remained until 1892. During the latter part of this period, and later, he lectured at the Sorbonne, a distinction accorded only to men of the highest degree of learning. In 1895 he began teaching mathematics at the École Normale, and in 1903 he became Professor of mathematics at the University of Paris. In 1900 he was elected a member



THOMAS PAINE

of the Institute. In 1915 he was appointed Minister of Public Instruction and Inventions Connected with National Defense, and in 1917 he assumed the post of War Minister.

PAINTERS' COLIC, a disease which derives its name from the fact that painters are more frequently attacked by it than persons of other occupations, though habitual cider drinkers, and people of various callings, are sometimes liable to its attack. The cause in all cases is the presence of lead in the system. This very serious disease commands the prompt attendance of a physician. Iodine of potassium is said to be an effective remedy for lead and mercurial poisoning.

PAINTING, an art which, by means of light, shade, and color, represents on a plane surface all objects presented to the eye or to the imagination. It was practiced by the Egyptians several thousand years before the Christian era.

Painting appears to have had its origin among all nations as a species of writing. Considered as an art, it may be said to consist of two chief parts—outline and design. Outline is a design without color, and examples of it may be seen in the cartoons of Raphael, Retzsch, Flaxman, and others. Design, properly so called, includes outline, representing the contour of objects, together with color, which gives to the image not only the hue, but also the form and relief proper to the object. The technical processes of painting are oil painting, water color painting, encaustic painting, miniature painting, fresco painting, enamel painting, etc. There are at least 10 branches of the art, viz., history, grotesques, portraits, fancy, animals, flowers and fruits, seascape, landscape, still life, and battle pieces.

PAISH, SIR GEORGE, British financier. He was born in 1867 and became attached to the staff of the "Statist," the chief London economic journal, before he was twenty, becoming subeditor in 1888, assistant editor in 1894, and associate editor in 1900. He became recognized throughout England as an authority on economics and was made governor of the London School of Economics. During the World War he made frequent visits to the United States to negotiate loans, and raised a commotion in 1919 by suggesting the issue of several billions to rehabilitate Europe. His books include: "Savings and Social Welfare"; and "Railroads of the United States."

PAISIELLO, GIOVANNI, an Italian singer and musician; born in 1741. Having early shown musical ability, he was well trained; and in 1763 his first opera ("The Pupil") was performed with great applause at Bologna. From this period commenced a long career of success, at Modena, Parma, Venice, Rome, Milan, Naples, and Florence. By the year 1776 he had composed nearly 50 operas, partly serious and partly comic, the chief of which are: "Demetrius"; "Artaxerxes"; "The Ridiculous Virtuosos"; "The Chinese Idol"; "The Marquis of Tulipano"; etc. In that year he entered the service of Catharine II. of Russia. Here during eight years' residence he composed his best productions, "The Maid Mistress," and "The Barber of Seville." He then visited Vienna, where he composed "King Theodore," another of his best operas, and 12 symphonies for the Emperor Joseph II. He died in 1816.

PAISLEY, a municipal and parliamentary burgh of Scotland, in Renfrewshire, on the White Cart, about 3 miles above the confluence of the united White and Black Cart with the Clyde, and 7 miles W. S. W. of Glasgow. It consists of an old town on the W. or left, and a new town on the E. or right bank of the river, communicating by three handsome bridges. The most noteworthy building is the Abbey Church, now a parish church, belonging to a monastery (of which little else now remains) founded in 1163 by Walter, son of Alan, the first of the house of the Stewarts. In 1889 a monument was erected by Queen Victoria in memory of her ancestors buried here. In St. Mirren's Chapel or the Sounding Aisle, on the S. side, stands a tomb supposed to have been built in honor of Bruce's daughter Marjory.

Paisley has been long noted for its manufactures, especially of textile goods. The shawl manufacture, introduced about the beginning of the 19th century, and long a flourishing industry, is not now a staple, but the textile manufacture is still large, and to it has been added that of sewing cotton, for which Paisley is celebrated all over the world. Among the other manufactures are tapestry, embroidery, tartans, and carpets. There are also dye and print works, engineering works, soap works, manufactories of starch, corn flour, mustard, and chemicals; distilleries, breweries, and shipbuilding yards, chiefly for river steamers and dredgers. Wilson, the ornithologist; the poet Tannahill, and Professor Wilson (Christopher North) were natives of Paisley, which possesses a bronze statue of the ornithologist and of the poet. Paisley is a town of ancient origin, having been at one time a Roman station under the name of Vanduara. Pop. estimated (1918) 89,425.

PAKHOI, a seaport of China; opened to foreign trade in 1876; on the N. shore of the Gulf of Tonkin. The harbor is shallow. Trade does not flourish. The imports—cottons, woolens, opium, rice—average $4,048,500 per annum; the exports—tin, sugar, indigo, aniseed, hides, groundnut oil—$1,148,500. Pop. over 20,000.

PALACIO VALDÉS, ARMANDO. A Spanish novelist. He was born in 1853, at Entralgo, Asturias, and studied law at Madrid. He there became editor of "La Revista Europea," and while so engaged began to write fiction. His first success came with "El Señorito Octavio" in 1881, but this was excelled by "Marta y Maria" which immediately won popular favor. His other works include: "Aguas Fuertes"; "José"; "El cuatro poder"; "La Hermana San Sulpicio";

"La espuma"; "La fe"; "El maestrante"; "El origen del personiento"; "Tristan, o el pesimismo," etc. Nearly all are translated into English and other languages.

PALÆARCTIC REGION, a very extensive region, comprising all temperate Europe and Asia, from Iceland to Bering Straits, and from the Azores to Japan. To the S. it includes the extra-tropical part of the Sahara and Arabia, and all Persia, Kabul, and Baluchistan to the Indus. It comes down to a little below the upper limit of forests in the Himalayas, and includes the larger N. portion of China, not quite so far down the coast as Amoy.

PALÆICHTHYES, or **PALEICHTHYES**, a sub-class of fishes. The heart has a contractile *conus arteriosus*, intestine with a spiral valve; optic nerves non-decussating or only partly decussating. It embraces two orders, *Chondropterygii* and *Ganoidei*.

PALÆOGRAPHY, or **PALEOGRAPHY**, an ancient manner of writing; ancient manuscripts collectively. Also the art or science of deciphering ancient inscriptions, writings, manuscripts, documents, etc., by a knowledge of the characters, signs, and abbreviations used by the writers or sculptors of various nations at different times; the study of ancient writings and inscriptions, and modes of writing.

PALÆOLOGUS, an illustrious Byzantine family, first mentioned about 1078, when George Palæologus was a faithful servant of the Emperor Nicephorus III. He was killed while defending Dyrrhachium, or Durazzo, against the Normans in 1081. The Palæologi, the last Greek family that occupied the throne of Constantinople, reigned from 1260 to 1453. A branch of the Palæologi ruled over Montferrat in Italy from 1305 to the end of 1530.

PALÆOTHERIUM, or **PALEOTHERIUM**, the type-genus of the family *Palæotheridæ*, resembling the antelope. It was founded on remains discovered by Cuvier in the quarries of Montmartre, and named by him *P. magnum*. Several species are known, varying in size from that of a roedeer to that of a tapir.

PALÆOZOIC, or **PALEOZOIC**, in geology, the term generally applied to the series of strata commencing with the first rocks which have traces of life, and ending with the upper part of the Permian. See FOSSIL: GEOLOGY.

PALAMEDES, a Grecian hero, the son of Nauplius, King of Eubœa.

PALATE, the roof of the mouth. The fore part is called the hard palate and the back part the soft palate, the former having an osseous framework and a membrane provided with many muciparous glands. In botany, the prominent lower lip of a ringent corolla.

PALATINATE, LOWER, or PALATINATE OF THE RHINE, the name formerly given to two states of Germany, which were designated, by way of distinction, the Upper and Lower Palatinate, and though not contiguous, were under the control of the same sovereign till 1620. The word palatinate is of feudal origin, and signifies the province or seigniory of a palatine, *i. e.*, of a high dignitary during the Middle Ages, who originally held office in the court of the sovereign, and was designated the *comes palatii*, but who afterward obtained, within his own province or district, the same power, rank, and jurisdiction, which the *comes palatii* possessed in the palace. Hence the old German title *pfalzgraf*, count-palatine; in English, palsgrave.

PALATINE HILL, one of the seven hills of Rome. It borders on the Forum and is said to be the site of the city founded by Remus.

PALATKA, a town and county-seat of Putnam co., Fla., on the Atlantic Coast Line, the Georgia Southern and Florida, the Florida East Coast and the Ocala Northern railroads; 30 miles S. W. of St. Augustine. It is noted for its large shipments of oranges and as a winter resort for Northern invalids. It also has large shipments of cotton, sugar, and various fruits. Pop. (1910) 3,779; (1920) 5,102.

PALEMBANG, capital of a residency (formerly an independent kingdom) near the S. end of Sumatra; on the Musi river, 50 miles from its mouth. The houses of the town are built on great log rafts on either bank. Manufactures, trade in silk goods, carved wood, ornaments in gold and ivory, and krises, as well as shipbuilding, are carried on. In the Middle Ages Palembang was one of the most important centers of Arabian trade with China. Pop. over 60,000; and of the residence about 775,000.

PALENCIA (the ancient Pallantia), a walled city of Spain, in Old Castile (province of Palencia) in a fruitful plain, 180 miles N. N. W. of Madrid. The Gothic cathedral was built 1321–1504. The first university of Castile was founded here in 1208, but was removed to Salamanca in 1239. Blankets and coarse

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LANDING IN SMALL BOATS ON THE ROCKY SHORE OF THE PORT OF JAFFA, PALESTINE

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OXEN TREADING OUT CORN NEAR NEBLUS, PALESTINE, AS IN SCRIPTURAL TIMES

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JERUSALEM. A STREET SCENE INSIDE THE JAFFA GATE

©E. M. Newman

A STREET SCENE IN HEBRON, PALESTINE

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FISHERMEN MENDING THEIR NETS ON THE SEA OF GALILEE, PALESTINE

©Publishers' Photo Service

A CEDAR GROVE ON MT. LEBANON, PALESTINE

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THE RIVER JORDAN AND THE WILDERNESS NEAR JERICHO, PALESTINE

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THE GARDEN OF GETHSEMANE, NEAR JERUSALEM

woolen cloths are manufactured. The vine is cultivated, and there is a good trade in wool. Pop. (1917) city, 13,256; province, 199,689.

PALENQUE, a village of Mexico, State of Chiapas, about 100 miles E. N. E. of Ciudad-Real. About 7 miles S. W. of it are extensive and magnificent ruins. They consist of vast artificial terraces, or terraced truncated pyramids, of cut stone, surmounted by edifices of peculiar and solid architecture, also of cut stone, covered with figures in relief, or figures and hieroglyphics in stucco, with remains of brilliant colors. Most of the buildings are of one story, but a few are two, three, and some have been four stories. The principal structure, known as the Palace, is 228 feet long, 180 feet deep, and 25 feet high, standing on a terraced truncated pyramid of corresponding dimensions. On slabs of stone are carved numerous colossal figures, and the remains of statues more resemble Grecian than Egyptian or Hindu art. These ruins were only discovered in 1750. (See Stephens' "Incidents of Travel in Central America," etc.; and Catherwood's "Views of Ancient Monuments of Central America," etc.)

PALEONTOLOGY. The study of the life which inhabited the earth during past geological periods. It is based on the study of fossils. Although it was long recognized that fossils were the remains of past life, and some attempt at study has been made, paleontology was placed on a scientific basis by Culver (1769-1832) and given great impetus by the publication of Darwin's "Origin of Species" in 1859, which presented the theory of evolution which was dependent upon the paleontologist for its proof.

There are two branches of paleontology—the branch of the science which studies the biological features of the fossils, and the more comprehensive geological branch which studies the relations between the fossils and the rocks and determines their period by them. Needless to say, the science is closely related to physical geography as well as biology and geology.

A very large portion of the life of former geological periods has not been preserved for us in the form of fossils, either because it was not of such a type as would lend itself to fossilization, or the evidences of the fossilization have been destroyed by erosion or the metamorphosis of the rocks in which they were imbedded, but in spite of these many gaps the history of organic development is rapidly being compiled and the advance of various types of life through successive geological periods has been studied.

Of course the animal and vegetable life inhabiting the earth at the time a rock is formed will be the fossils which are found in that rock, and evidence of the predominance of different types of life in various geological periods and the sequence of these periods has been determined. The major geological periods or eras take their names from the type of life predominating, and the divisions of these periods are named from the species. During the Paleozoic era the earth was inhabited by invertebrates, by reptiles during the Mesozoic era and by mammals in the Cenozoic era.

The fauna which are found in the lowest strata are those which originally were best adapted to the locality and which had conquered in the struggle for existence. These are indigenous faunas. Often the changes in the climate or topography of the locality cause the introduction of a new type of life called exotic fauna, which may either die out, or thrive and become the predominating or indigenous fauna of the locality.

Bionomy is that branch of paleontology which deals with marine organisms and its branches are: Plankton, which considers those forms of life which drift with the current; Nekton, the study of the swimming types; and Benthos, the life of the bottom of the ocean. The deposits found at beaches and in shallow places are called Littoral Facies; those in moderately deep water Sub-littoral Facies, and the deposits of the deep sea are Abyssal Facies.

The study of the ranges of temperature and the temperature zones of geological time, the discovery of extinct species and even orders, the proof of changes in type in adaptation to circumstances have been some of the results of paleontological research.

PALERMO (ancient Panormus) (Palermo province), the capital city, and a seaport of Sicily, on the N. W. extremity. It is built on the S. W. of an extensive bay, in a plain, which, from its luxuriance and from being surrounded by mountains on three sides, has been termed the "golden shell." In the front of the city is the Mariana, a raised terrace, extending more than 1 mile along the bay, and is about 200 feet wide. The principal public buildings are, the royal palace, the tribunal of justice, the custom house (formerly, palace of the Inquisition), etc. Manufactures silk and cotton fabrics, glass, oil cloth, and leather. Nearly 1,000 boats, and 3,500 fishermen are engaged in the tunny fishery. Ex-

ports principally sumach, fruits, wine, manna, and brimstone. Palermo, the ancient Panormus, is first mentioned in history 480 B. C., when the Carthaginians made it a naval station. It was taken by the Romans 254 B. C., and it became one of their principal naval stations. The Normans took it in 1072, and in 1282 it was the scene of the massacre called the "Sicilian Vespers." Palermo was taken by Garibaldi in May, 1860. Pop., city, about 350,000; province, about 810,000.

PALERMO, GULF OF, a bay or arm of the Mediterranean Sea, near Palermo.

PALESTINE, or HOLY LAND, a country of southwestern Asia, comprising the S. part of Syria, and forming before the World War the pashalics of Acre, Gaza, and the S. part of Damascus; having N. the pashalic of Tripoli, S. E. and S. the Arabian Desert, and W. the Mediterranean; length, 193 miles; average breadth, 75 miles; area, 11,000 square miles. The surface is generally mountainous, interspersed from N. to S. by the mountain chain of Lebanon, Mount Hermon, the highest peak, attaining an elevation of 10,000 feet. There are numerous other peaks famous in sacred history, viz.: Mount Carmel; Mount Tabor, the modern Jebel Toor; Gilead, and Nebo or Pisgah; and Zion, Moriah, and the Mount of Olives, in or near Jerusalem.

Judæa proper, the ancient kingdom of Judah, comprises the territory extending from Lake Asphaltites to the sea, and consists of hills and valleys of great beauty and fertility. In proceeding E. to the shores of the Dead Sea the scene becomes more decidedly barren. To the N. of ancient Judæa was Samaria, a mountainous district, but flourishing and well cultivated. To the N. of Samaria, but still communicating with Judæa by the banks of the Jordan, is Galilee, distinguished by its natural beauty and fertility. The plain of Esdraelon is one vast meadow, covered with the richest pasture. The Lake of Tiberias, or Gennesareth, is surrounded by lofty and picturesque hills. The regions beyond Jordan include many tracts once fertile and flourishing. Here are the Hauran and Dschaulan, a vast plain, not watered by any great river; yet the inhabitants contrive, by collecting the torrents and rain water into ponds, to obtain a sufficient supply for agriculture; so that very extensive crops of grain are raised. The rivers are the Jordan, Jarmuth, Kishon, and the Nahr, Naman or Belus. The lakes Tiberias, Gennesareth, and the Dead Sea. The climate is very fine in the dry season. Products, wheat, barley, millet, tobacco, and fruits.

Its most ancient name was Canaan, its inhabitants being descended from Canaan, the fourth son of Ham and grandson of Noah. Under the reigns of David and Solomon it became one of the most flourishing kingdoms of Asia. It was conquered, however, by the kings of Nineveh and Babylon, who carried captive first Israel and then Judah, into the E. provinces of their empire. After the conquest of Babylon by Cyrus, the Jews were allowed to return to their country. Palestine continued thus a province of Persia till after the conquest of Alexander. The Jews were again exposed to oppression from some of the Ptolemies, who having attempted to enforce the adoption of the Grecian idolatry, were met with the most determined resistance by the Maccabees, and Judæa now became an independent country. It subsequently fell under the dominion of Rome, who established the Herods as tributary kings. The country remained in the power of the Romans till the conversion of the empire to Christianity. In the 6th century it fell under the sway of the Mohammedans, which gave occasion to the Crusades. Jerusalem was taken by the European forces, and was under Godfrey of Bouillon erected into a Latin kingdom, which endured for above 80 years, during which the Holy Land streamed with Christian and Saracen blood. In 1187 Judæa was conquered by Saladin, on the decline of whose kingdom it passed through various hands, till, in 1517, it was finally added to the Turkish empire. A railroad connecting Jaffa with Jerusalem has been constructed, and a harbor made at Jaffa.

In the World War (1914-1918) the Anglo-Indian army captured Jerusalem (pop. 85,000) on March 11, 1917, and the whole of Palestine was occupied in the following year. The British constituted it a Jewish state after the war, with General Allenby High Commissioner (also of Egypt). The Rt. Honorable Herbert Samuel was appointed High Commissioner in 1920.

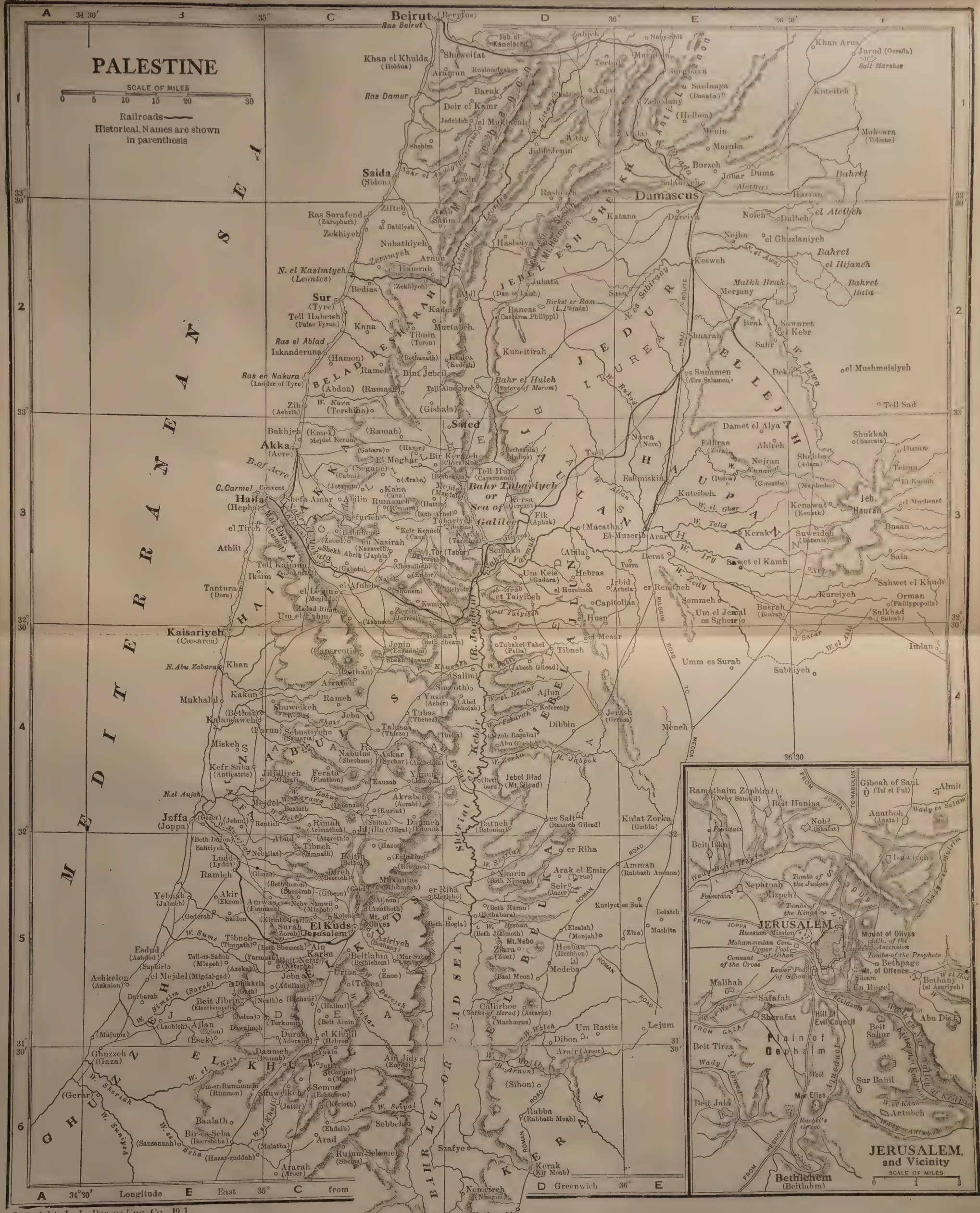
PALESTINE, a city of Texas, the county-seat of Anderson co. It is on the International and Great Northern railroad. It has an important trade in cotton, lumber, beef, iron, fruit, and vegetables. There are iron and salt mines in the vicinity. It has a public library, a county court house, and the general offices of the Great Northern railroad. Pop. (1910) 10,482; (1920) 11,039.

PALESTRINA (the ancient Præneste), an Italian city, 22 miles E. by S. of Rome, on the slope of an offset of the

PALESTINE

SCALE OF MILES
0 5 10 15 20 30

Railroads
Historical Names are shown in parenthesis


Beirut (Berytus)
Ras Beirut
Khan el Khulda (Heldua)
Shuweifat
Ras Damur
Baruk
Deir el Kamr
Saida (Sidon)
Ras Surafend (Zarephath)
Zifteh
Zekhiyeh
Nubathiyeh
N. el Kasimiyeh (Leontes)
Sur (Tyre)
Tell Habeish (Palae Tyrus)
Ras el Ablad
Iskanderuna
Ras en Nakura (Ladder of Tyre)
Zib (Aehzib)
Akka (Acre)
B. of Acre
C. Carmel
Haifa
Athlit
Tantura (Dora)
Kaisariyeh (Caesarea)
N. Abu Zabura
N. el Aujeh
Jaffa (Joppa)
Ludd (Lydda)
Ramleh
Yebnah (Jabneh)
Esdud (Ashdod)
Ashkelon (Askalon)
Ghuzzeh (Gaza)
Gerar
Baalath
Bir-es-Seba (Beersheba)
Sansannah
Arad
Ararah (Aroer)
Safed
Bahr Tabariyeh or Sea of Galilee
Tell Hum (Capernaum)
Haifa
Nazareth
Jenin (Engannim)
Tubaket Fahel (Pella)
Tibneh
Damascus
Katana
Daraiya
Hasbeiya
Jubata
Baneas (Caesarea Philippi)
Kuneitirah
Bahr el Huleh (Waters of Merom)
Kedes (Kedesh)
Tell Almaliyeh
Gishala
Bint Jebeil
Rameh
Kana
Tibnin (Toron)
Murtabeh
Kadeish
Abil (Dan or Laish)
Jubata
Birket er Ram (L. Phiala)
Susa
Nejha
el Ghuzlaniyeh
Kesweh
Matkh Brak
Merjany
Brak
Suwaret el Kebr
Sahr
Shaarah
Dekn
es Sunamen (Ære Salamon)
el Mushmeisiyeh
Tell Sad
Damet el Alya
Nawa (Neve)
Edhraa (Zora)
Ahireh
Nejran
Eshmiskin
Kuteibeh
Shukkah (Saccaia)
Duma
Teima
El Kuseib
Shubba (Adasa)
Kenawat (Kenath)
Jeb.
Hauran
Busan
Suweideh (Batanis)
Sala
Sahwet el Khudr
Orman (Philippopolis)
Kureiyeh
Sulkhad (Salcah)
Imlan
Umm es Surab
Subhiyeh
Meneh
Jerash (Gerasa)
Ajlun
Dibbin
Kulat Zorka (Gadda)
Amman (Rabbath Ammon)
Arak el Emir (Tyrus)
Seir (Jazer)
Kuriyet es Suk
Belateh
Mashita
Batneh (Betonim)
es Salt (Ramoth Gilead)
er Riha
Jebel Jilad (Mt. Gilead)
Tubaket Fahel (Pella)
Tibneh
Jabesh Gilead
Yabis
Akrabeh (Acrabi)
Askar (Sychar)
Nablus (Shechem)
Tubas (Thebez)
Yasir (Asher)
Abel Meholah
Jezreel
Zerin
Shunem
Gilboa
Jenin
Besan (Beth Shean)
Dothan
Arrabeh
Kakun
Mukhalid
Miskeh
Kefr Saba (Antipatris)
Jiljilliyeh (Gilgal)
Ferata (Pirathon)
Rimah (Arimathea)
Jiljilia (Gilgal)
Tibneh (Timnath)
Beitin (Bethel)
Mukhmas (Michmash)
Jericho
Jordan
Dead Sea
Bahr Lut
Callirhoe (Baths of Herod)
Machærus
Mt. Nebo
Ziara (Zour)
Medeba
Hesban (Heshbon)
Elealah (Menjah)
Beth Haran (Bethabara)
Beth Jesimoth
Um Rastis
Lejum
Dibon
Arair (Aroer)
Aroer
Rabba (Rabbath Moab)
Kerak (Kir Moab)
Szafye
Nemeireh (Nimrim)
Ketherabba
Safieh
Jerusalem
El Kuds
Mt. of Olives
Bethlehem
Hebron
Beit Jibrin (Eleutheropolis)
Tell Kajmun (Jokneam)
Iksim
Dawaimeh
Adoraim
Yukin
Jutta
Carmel (Maon)
Semua (Eshtemoa)
Kerioth
Jattir
Ain Jidy (Engedi)
Ain Karim
Beit Netif (Netapha)
Jeba (Adullam)
Urtas (Etam)
Tekoa
Halhul
Beit Ainin
Terkumia
Dhikkrin (Gath)
Yarmuth (Jarmuth)
Tell-es-Safieh (Mizpeh)
Azekah
Surah (Zorah)
Kiriath Jearim (Mizpah)
Nebv Samwil
Amwas (Emmaus)
Saidon
Gederah
Beth Shemesh
Beth Hogla
Jericho
Ain Duk
Ain Feshkha
Ain Jidy
Ain Feshkha
Ain Hajla
Ain Nimrin
Ain Sheikh Hasan
Ain Sheikh Ali el Hamed
Ain Sheikh Ali el Hamed
Ain Sheikh Ali el Hamed

Apennines. It contains the chief castle of the Colonnas and the palace of the Barberini family, the owners after 1630. It is built almost entirely upon the gigantic substructions of the ancient Temple of Fortune, one of the greatest religious edifices in all Italy, celebrated not only for its splendor, but also for its oracle, which was consulted down to the time of Constantine. Its elevated and healthy situation, at no great distance from the capital, made it a favorite summer resort of the Romans. Augustus and Tiberius frequented it; Horace found it a pleasant retreat; Hadrian built there an extensive villa; and Antonius erected a palace. Numerous valuable works of art and other remains have been recovered, dating principally from the 8th, and from the 3d and 2d centuries B. C.

PALESTRINA, GIOVANNI PIETRO ALOYSIO DA, an Italian musician and composer; born in Palestrina, an ancient city 20 miles from Rome, in 1529; and was admitted into the Pope's Chapel in 1559. This musician holds the most prominent rank as a composer of ecclesiastical music of that age, his motets, masses, and chants being still in use. Palestrina has been regarded as the Homer of ancient music and the father of choral melody. He died in 1594.

PALEY, WILLIAM, an English theologian; born in Peterborough, in 1743. He was appointed archdeacon of Carlisle, 1782; prebendary of St. Paul's, London, 1794; dean of Lincoln, 1795. His principal writings are: "Principles of Moral and Political Philosophy" (1785); "Horæ Paulinæ; or, "The Truth of the Scripture History of St. Paul Evinced," etc. (1791); "View of the Evidences of Christianity" (1794), his most celebrated work; "Natural Theology; or, Evidences of the Existence and Attributes of the Deity Collected from the Appearances of Nature" (1802), in some respects the most remarkable of all his writings. He died May 25, 1805.

PALFREY, JOHN GORHAM, an American clergyman; born in Boston, May 2, 1796. He was graduated at Harvard; was pastor of Brattle Street Unitarian Church, Boston; professor in Harvard, 1830–1839; member of the State Legislature, 1842–1843; secretary of State of Massachusetts, 1844–1848; and member of the Anti-Slavery Congress at Paris, 1867. He published "The Relation between Judaism and Christianity" (1854). His enduring work, however, is, "The History of New England" (4 vols. 1858-1864). He died in Cambridge, Mass., April 26, 1881.

PALGHAT, a town in the district of Malabar, Madras, India. It has several important educational institutions and a Swiss Protestant Mission. There is considerable trade in grain, tobacco, lumber, and oil. Pop. about 45,000.

PALGRAVE, SIR FRANCIS, an English historian; born in London, England, in 1788. He was a Jew, and his original name was Cohen, which he changed to Palgrave on embracing Christianity in 1823. He was called to the bar in 1827, and made himself known by his edition of the "Parliamentary Writs from 1273 to 1327" (1827–1834); "History of England" (1831); "Rise and Progress of the Commonwealth" (1832). In 1832 he was knighted. His other works include "Truths and Fictions of the Middle Ages" (1844); "Reports of the Deputy-Keeper of the Public Records" (1840-1861); and "History of Normandy and England" (1851–1860). He died in Hampstead, July 6, 1861.

PALGRAVE, FRANCIS TURNER, an English poet and critic, eldest son of the preceding; born in London, England, Sept. 28, 1824. He was educated at Charterhouse School, became scholar of Balliol College, Oxford, and Fellow of Exeter, filled for five years the office of vice-principal of the Training College for Schoolmasters at Kneller Hall, was private Secretary to Earl Granville, and an official in the Educational Department of the Privy-council. He became Professor of Poetry at Oxford in 1886. His works are "Idylls and Songs" (1854); "Essays on Art" (1866); "Hymns" (1867); "Lyrical Poems" (1871); and the "Visions of England" (1881). He is best known, however, as the editor of "Golden Treasury of English Lyrics" (1861, and a 2d series in 1895); "The Children's Treasury of Lyrical Poetry" (2 vols. 1875); "The Sonnets and Songs of Shakespeare" (1877); "Selected Lyrical Poems of Herrick" (1877), of Keats (1885); and "Treasury of Sacred Song" (1889). He died Oct. 24, 1897.

PALGRAVE, WILLIAM GIFFORD, an English traveler, son of Sir Francis; born in Westminster, England, Jan. 24, 1826. He was educated at the Charterhouse School and Oxford, graduating with great distinction in 1846. Next year he obtained a commission in the Bombay Native Infantry, which he resigned to become a priest in the Society of Jesus. After studying in France and at Rome he was sent at his own request as a missionary to Syria, where he acquired a wonderfully intimate knowledge of Arabic. Summoned to France in 1860

by Napoleon III. to give an account of the Syrian massacres, he went disguised as a physician on a daring expedition at the emperor's expense through central Arabia, traversing the entire Wahabi kingdom, and returning to Europe through Bagdad and Aleppo (1862–1863). His "Narrative of a Year's Journey Through Central and Eastern Arabia" (1865), is one of the best books of travel in the English language. Palgrave quitted the Society of Jesus in 1864. He was nominated consul at Sukhum-Kalé in 1866, at Trebizond in 1867, St. Thomas in 1873, at Manila in 1876, and consul-general in the principality of Bulgaria in 1878, and in Siam in 1880. He was appointed British minister to Uruguay in 1884. His other works are: "Essays on Eastern Questions" (1872); "Hermann Agha: an Eastern Narrative" (1872); "Dutch Guiana" (1876); and "Ulysses, or Scenes and Studies in Many Lands" (1887). He died in Montevideo, Sept. 30, 1888.

PALI, an Indian language, originally the popular dialect of Maghada, now Behar. Buddha preached in it, and the writings embodying his faith were composed in it, on which account it became the sacred language of Buddhism. It is closely akin to Sanskrit.

PALILIA. A Roman goddess of shepherds.

PALIMPSEST, a piece of parchment whose original writing has been removed to fit it for a subsequent record.

PALINGENESIS, a biological law which states that the characteristics of the offspring are inherited from the parents, in contrast to the theory of *cenogenesis*, which states that the characteristics are the result of environment.

An illustration of the first case is the development of the frog, which undergoes a complete change, not only in outward appearance, but in respiratory system, in the change from the polliwog, with the long tail and respiratory gills, to the tailless frog with lungs for breathing.

Research has proved that this has always been the development of this type of animal. On the other hand, in the case of many insects, the offspring were born in the form of the parent, but have recently (biologically speaking) developed a laval stage of development—for example, the change of the caterpillar into the moth.

PALISADE, a fence or fencing of pales or stakes driven into the ground, to form an inclosure, as a protection to property. In fortification, a row of stakes set firmly in the ground and presenting a sharp point to an advancing party. The stakes are placed vertically at the foot of the slope of the counterscarp, or presented at an angle at the foot of a parapet, or on the banquette of the covered way.

PALISSY, BERNARD, a French potter and chemist; born in Agen about 1508. He wrote several works on natural philosophy, and on subjects connected with the art of pottery. His pottery has become celebrated, and few things are more prized by the connoisseur than the famous "Palissy ware." Being a Protestant, he was arrested by the Leaguers toward the end of the reign of Henri III., and died in the Bastille in 1589.

PALISSY WARE, a peculiar pottery first manufactured in France by Bernard Palissy of Saintes, about 1555. His works are remarkable for the high relief of his figures and ornament, which consist frequently of models from nature of fish, reptiles, shells, leaves, etc., all most carefully and naturally colored. The art may be said to have died with him.

PALK STRAIT, a channel between the mainland of India and the N. part of Ceylon, abounding in shoals, currents, sunken rocks, and sand-banks.

PALLADIUM, in classical antiquities, a celebrated statue of Pallas or Minerva, on the preservation of which depended the safety of the city of Troy. This circumstance being known to the Greeks during the Trojan War, Ulysses and Diomedes, by the advice and aid of Helenus, son of Priam, climbed secretly by night over the ramparts of Troy and carried it off.

In chemistry, a tetrad metallic element discovered by Wollaston in 1803. It is found associated with platinum and gold, in South America. It resembles platinum in its malleability and ductility, but is more fusible, less dense, and has a more silvery appearance.

In mineralogy, an isometric native metal, not found pure, but mostly alloyed with a little platinum and iridium. Sometimes found in minute octahedrons, but mostly as grains, with native platinum, in Brazil.

PALLAS, in Greek mythology, the goddess of wisdom. Her attributes and character were similar to those of the Roman Minerva.

PALLEN, CONDÉ BENOIST, an American journalist and writer, born at St. Louis, in 1858. Graduated from Georgetown University in 1880, and

afterward carried on post-graduate courses in other universities. From 1887 to 1897 he was editor of the "Church Progress" and "Catholic World." He had charge of the Roman Catholic department in a number of encyclopædias and was managing editor of the "Catholic Encyclopedia." He was author of "The Philosophy of Literature," (1897); "What is Liberalism?" (1899); "Education of Boys," (1916). He also produced several volumes of poems.

PALLIUM, a square woolen cloak, much resembling the chlamys, from which it can only be distinguished by its greater length and amplitude. It was capable of enveloping the entire person, which it could cover at night as a blanket. It was much worn by the Greeks, corresponding to the toga of the Romans. In ecclesiology, a pall, an ornamental band of white wool three fingers broad, to be worn around the shoulders, with pendants a span in length before and behind, the ends ornamented with red crosses. In the time of Gregory VII. (1073-1085) archbishops went for it to Rome; afterward the Popes sent it to them when they received their appointment. In zoölogy, the mantle of a bivalve mollusk.

PALMS

1. Betel nut palm. 2. Palmyra palm. 3. Cocoanut palm. 4. Double cocoanut palm.

PALM (*Palmæ* or *Palmaceæ*), a natural order of endogenous plants, the products of which are of extreme importance and utility to man. They are arborescent, with erect stems, usually slender as compared with the extreme height to which some of the species attain; and simple or rarely branching; some are stemless, their leaves springing direct from the ground; others are sarmentose, twining about the stems and branches of neighboring trees, by means of books or prickles, or trailing on the ground with stems of almost incredible length and extreme slenderness, as in the case of many of the Calami. The interior of the stem is generally soft and pithy, intermingled with bundles of fiber longitudinally. The leaves vary much in form superficially, but all the variations belong to two types—the fan veined and the pinnate-veined. In the former the general outline is that of a fan. In the other type the leaves are more or less elongated. Leaves of this type are sometimes entire, but more generally pinnate, and impart much elegance and grace to the figure of the particular species to which they belong. The size of palm leaves varies extremely, some being only a few inches in length, as in some species of Malortia, while in *Manicaria saccifera* they attain the enormous proportions of 35 feet in length by 5 or 6 feet in breadth. The flowers are small individually, but numerous, usually of a yellow tint, and in some species powerfully odorous. They are unisexual, bisexual, or polygamous, the male and female flowers being borne in some species on different plants. The fruit when ripe is berry-like, drupaceous, plum-like, or, as in the cocoanut, nut-like.

Palms are native chiefly of the tropical regions of the earth. Their stems when young and tender are delicious and nutritious food; when old and mature those of certain species yield valuable farinaceous substances; some are valuable as timber trees, and the termi-

nal bud of several consists of a mass of tender mucilaginous leaves, which are esteemed a delicate and delicious vegetable. Many yield by incision or otherwise an abundance of sweet sap, from which sugar, refreshing drinks, wines, spirits, and vinegar are obtained. Their leaves are used for thatch, and for the making of mats, baskets, hats, umbrellas, thread, cord, and clothing. They yield excellent and inexhaustible materials and they are in some cases a natural substitute for writing paper, the records and writings of many Eastern peoples being inscribed upon them.

The order comprises between 130 and 140 genera, and the number of species known is variously estimated by different authorities as from 600 to 1,000.

The genus *Chamædorea*, composed of about 60 species, are used in South America for making bridges. The flowers of several of the species are highly esteemed as a culinary vegetable in some of the countries of Central America. The fruit of *Leopoldina major*, called by the natives of Brazil *Jará-assu*, is collected by them and burned, and the ash, after being washed, is used as a substitute for salt. *Euterpe edulis*—also a native of Brazil—produces fruit like the sloe from which a beverage is made and *Oncosperma filamentosa* furnish edible cabbage. From the fruit of the *Œnocarpus batava* a wholesome beverage called *Patawa-yukissé* is made on the Rio Negro. The fruit of *Oreodoxa regia*, an extremely handsome palm, a native of Cuba, is too acrid for human food, but is used there for fattening hogs.

Areca catechu is the betel-nut palm, the fruit is much used in India. Besides being used as a masticatory and medicine in cases of dysentery, the substance is employed in tanning leather and in dyeing calico. But the true cabbage palm is *A. oleracea*, indigenous to the West Indies, attaining the height of 170 to 200 feet, with a diameter of stem of about 7 feet. The terminal bud or "cabbage" has the flavor of the almond, but with greater sweetness, and is boiled and eaten with meat. Its removal causes the death of the tree. The inflorescence is extracted from the spathes before they open, are pickled, and esteemed a delicate relish with meat. The nuts yield a useful oil by decoction. The shell or outer hard crust of the stem is employed in making gutters, and the pith yields a kind of sago if extracted immediately the tree is felled.

Ceroxlyon (*Iriartia*) *andicola*, a native of Peru, growing at an elevation of 8,000–10,000 feet above sea-level, is a handsome species rising to the height of 160 or more feet. The stem exudes from the annular cicatrices of the fallen leaves a resinous substance called by the inhabitants *cera de palma*. It is employed in candle making. Besides the resinous exudation the trunk yields a valuable and durable timber, the leaves are excellent and durable material for thatch, and they supply a strong, useful fiber for the manufacture of ropes and cordage. The kiziuba palm (*C. exorrhiza*) is a native of Central and South America. The timber is used in flooring and for making umbrella sticks, musical instruments, etc. Blowpipes for poisoned arrows are made from the stems of *C. setigera* (see BLOWPIPE).

The sugar palm (*Arenga saccharifera*) is a native of the Moluccas, Cochin-China, and the Indian Archipelago. It yields an abundant sweet sap, from which a chocolate-colored sugar named *jaggery* is made. The sap fermented makes an intoxicating drink variously named by the inhabitants of the different countries *neroo* or *brum*. From the pith of the stem sago is obtained in great quantity, a single stem yielding as much as from 150 to 200 pounds. The leaves supply *Gomuto fiber*, which is celebrated for its great strength and durability when formed into cordage and ropes, and at the base of the leaves a fine woolly material, named *baru* is employed in caulking ships, stuffing cushions, and making tinder.

Caryota urens, one of the noblest palms of India, yields some remarkable products. From the terminal bud a sweet watery liquor is obtained. The terminal bud is also eaten as a cabbage. From the pith of the stem sago is obtained, which is made into bread, and prepared in various other ways, and is a valuable article of food to the natives.

The genus *Calamus* and its immediate allies are regarded as forming a connecting link between the palms and the grasses. Certain species—viz. *C. Roxburghii*, *C. Royleanus* furnish the rattan canes employed in making ropes and cables, chair bottoms, couches, baskets, mats, etc. The walking sticks known as Malacca canes are made from the stems of *C. scipionum*, a species which grows not in Malacca, but in Sumatra. The stems of the great rattan (*C. rudentium*) and others are of prodigious length with a dense siliceous crust on the surface. *C. draco* furnishes the finest quality of the resinous substance known as "dragon's blood." *Zalacca edulis* is regularly cultivated by the Burmese for the sake of its pleasantly acidulous fruit. *Raphia vinifera*, a native

of Guinea, yields a rather abundant sap, from which a strongly spirituous wine is obtained. One of the most beautiful and singular of palms is *R. tædegera*, an inhabitant of the banks of the Amazon. The trunk of the tree is short, from 6 to 10 feet high, but from the summit the leaves rise almost perpendicularly to the height of 40 feet or more. The footstalk of these enormous leaves are often 12 or 15 feet long by 4 or 5 inches in diameter. The integument being easily split into straight strips, is made into window-blinds, baskets, etc., by the Indians.

The true "sago" of commerce (see SAGO) is derived from various species of the genus *Sagus*. The tree is small, rarely exceeding 30 feet in height of stem, which consists of a hard shell about 2 inches thick inclosing a mass of spongy pith—the sago. When felled the stem is cut into lengths of 6 or 7 feet, which are split, the better to remove the pith. Washing and straining are the principal features of every process. A single tree, it is said, will yield from 500 to 600 pounds of sago. The bache (*Mauritia flexuosa*), a native of Guiana, furnishes timber for building dwellings, the leaves thatch for the same, and material for mats, couches, hammocks, etc.; the pith yields sago; the juice by fermentation gives an excellent beverage; the kernels of the fruits are ground into meal and made into bread; and the fiber is converted into cordage and clothing. The Palmyra palm (*Borassus flabelliformis*) is one of the most common of its tribe in India. It furnishes the greater part of the palm wine of India. A tree yields about three quarts daily. The liquor is drunk fresh, and will only keep sweet for about three days, when it undergoes fermentation and becomes sour, and is distilled into *arrack*. *Jaggery* is also made from the juice. The young plants when a few inches high are cooked and eaten as a vegetable. In India the leaves are almost universally used for writing upon with an iron stylus.

The double cocoanut, or sea cocoanut as it has been called, is *Lodoicea seychellarum*. The nuts of this tree are often beautifully polished and carved by native workmen, and formed into caskets and other ornaments. The tree, a native of the Seychelle Islands, is very beautiful, attaining a height of from 50 to 80 feet, with leaves 20 feet long supported on stalks of equal length. The chief products of the tree are timber and fiber for cordage, and a downy kind of fiber which envelops the young leaves is used for filling mattresses and pillows.

The Talipat palm of Ceylon (*Corypha umbraculifera*) is notable only for the variety of uses to which its leaves are put in Ceylon and other parts of India. They are readily formed into umbrellas and tents; also very much used for the books or *colahs* of the inhabitants. Many of these alleged to be made of Egyptian papyrus are formed of the leaves of this palm. The tree grows to the height of 100 feet. *Licuala peltata* is the Chittah-pat of Assam, the leaves of which are extensively used for making umbrellas, punkahs, and hats. The stems of *L. acutifolia* are made into walking sticks, named by Europeans "Penang Lawyers." *Copernicia cerifera*, a native of northern Brazil, produces an edible fruit; and from the leaves is obtained an inferior vegetable wax used in candle making.

Of the American palmetto palm, a native of the Carolinas and Florida, the most important species is the cabbage palmetto (*Sabal palmetto*). Its products are timber and the leaves, the former being exceedingly durable, very porous, and especially valuable for wharf building, as it resists water and is not attacked by the teredo. The palmetto of Europe is *Chamærops humilis*, which inhabits the countries on both shores of the Mediterranean, occupying great tracts. It rarely reaches 10 feet in height, and usually is much less. The leaves are fan-shaped and abound in excellent fiber, with which the Arabs, combining it with camel's hair, make tent covers; in Spain it is made into ropes and sailcloth, and in France into carpets named African haircloth. The French in Algeria make paper and pasteboard of it. The fruit is edible, and is eaten by the Arabs and the inhabitants of Sicily and southern Italy. *C. Ritchieana*, a native of Scinde and Afghanistan, and *C. excelsa*, a native of China and Japan, both produce excellent fiber. The leaves of *Thrinax argentea* supply the material called "chip," of which ladies' hats and bonnets of that name are made. The trunks of *T. parviflora*, a native of Jamaica, though of slender diameter, are said to be very suitable for piles and marine buildings.

The *Piritu* of Venezuela, the *Paripou* of Guiana, and the *Papúnba* of the Amazon are the local names of one species of palm—*Gulielma speciosa*. It produces fruits somewhat triangular in shape, about the size of an apricot, and bright reddish yellow in color. They have a peculiar oily flavor, and are eaten boiled or roasted, when they resemble chestnuts. They are also ground into meal, which is baked in cakes. The

Great Macaw tree of the West Indies (*Acrocomia sclerocarpa*) is a native of Jamaica, Trinidad, and the adjacent islands and continent. In Brazil it is called *Macahuba*, and in Guiana *Macoya*. The fruit yields an oil of yellow color, sweetish taste, and having the odor of violets, which is employed by the natives as an emollient for painful affections of the joints; and in Europe it is used in the manufacture of toilet soaps. The Tucum palm (*Astrocaryum tucuma*), a native of the Rio Negro and the upper Amazon, yields a very superior fiber. The fleshy outer covering of the fruit is eaten by the natives. The Murumuru palm (*A. murumuru*) produces a very agreeable fruit with the fragrance of musk. Cattle eat it with avidity. *Attalea funifera* furnishes the whalebone-like fiber now so much used for making brooms and brushes. The tree attains the height of 20 or 30 feet. At the base of the leaves, which are used for thatching, the fiber known in commerce as piassava fiber, is employed in the countries in which it grows to make coarse but strong and durable cables. The fruit is the well-known Coquilla nut, much used in turnery for the making of knobs to walking sticks and umbrellas, handles to bell pulls, etc. The print of *A. cohune* yields from its kernel a valuable oil called cohune oil. It is a native of Honduras and the Isthmus of Panama. The trunk, which attains the height of about 40 feet and is crowned with leaves some 30 feet long, yields by tapping a kind of palm wine. The palm oil of Africa is the product of the fruit of *Elæis guineensis*. The tree is cultivated now in the West Indies and tropical South America for the sake of the oil. It is used by the natives universally as butter is in Europe. The quantity of palm oil now exported is enormous. It is employed in the manufacture of candles, toilet and common soaps, and as a lubricant of railway carriage wheels, etc. The *Coquito* of Chile is *Jubæa spectabilis*. From its trunk a syrup is extracted, called *miel de palma*, which is much esteemed by the Chileans and Europeans.

PALMA. (1) The capital of the island of MAJORCA (*q. v.*) and of the Balearic Islands, on the Bay of Palma, on the S. coast. The cathedral, a Gothic edifice (1322–1601), contains the tomb of King Jayme II. of Aragon and a valuable collection of church ornaments. The tomb of Raymond Lully is in the church of St. Francis. There are, further, a beautiful exchange (1426–1446), an old Moorish palace, and a 16th-century town hall, with pictures. Its inhabitants weave silks and woolens, make jewelry, and various articles of common use. The port is protected by a mole, and the town by a wall and batteries. Pop. about 70,000. (2) A town of Sicily, pop. 12,000. (3) The name of one of the larger of the Canary Islands.

PALMA, TOMAS ESTRADA, a Cuban statesman and soldier, called the "Franklin of Cuba"; born in Bayamo, Santiago de Cuba, July 9, 1835. He was educated at Havana and studied law at the University of Seville, Spain. In 1867 he allied himself with the patriots working for Cuban independence, became a leader and the bosom friend of Cespides and Aguilera, the first president and first vice-president. When Cespides raised the standard of revolt, Oct. 10, 1868, Palma freed his slaves and aided the movement to the utmost. He took the field and his devoted mother shared the dangers of camp life with him. During his absence one day his detachment was surprised by the Spanish and his mother captured. She was compelled to walk behind the troops till she fell from exhaustion, and was abandoned in the woods, where her son found her, two weeks later, starving. She died a few days later.

After the capture of Bayamo, Palma was elected to the Cuban assembly and became secretary of the republic under the presidency of Spoturno. On the resignation of Spoturno, the Cuban Assembly elected Palma president, March 29, 1876. He performed the duties of the office with ability, but was, through the treachery of a Cuban, captured by a force of Spanish soldiers while on a journey. He was sent to Spain and imprisoned for a year in the castle of Fieuras. On the subsequent surrender of the revolutionists he was set at liberty and went first to Paris, and from there to New York. Later he went to the republic of Honduras, where he began work as a schoolmaster and became postmaster-general. He there married the daughter of President Guardiola and returned to the United States, where he settled in Orange co., New York. In July, 1895, he was elected delegate or president of the Associated Cuban clubs in the United States, to fill the vacancy caused by the death of José Marti. In September of the same year he was made minister or delegate plenipotentiary abroad of the republic of Cuba. On Dec. 31, 1901, he was elected first president of the new Cuban republic, was re-elected in 1906, but resigned. He died Nov. 4, 1908.

PALMAS, CAPE, headland of western Africa, on the Guinea coast, lat. 4°

22′ 6″ N., lon. 7° 44′ 15″ W. There is a lighthouse with a fixed light, and the adjacent harbor is the only one between Sierra Leone and Benin.

PALMBLAD, VILHELM FREDRIK, a Swedish historian; born in Liljested, East Gothland, Dec. 16, 1788. He studied at Upsala, and became Professor of Greek in the same university in 1835. Among his works are the "Biographical Dictionary" (23 vols. 1835–1859) and the historical novel "Aurora Königsmark" (1847). He died Sept. 2, 1852.

PALMER, a town of Massachusetts, which includes several villages, in Hampden co. It is on the Chicopee river, and on the Central Vermont and the Boston and Albany railroads. Its industries include cotton goods, foundry and machine-shop products, carpets, wire, etc. It has a public library, and a Y. M. C. A. building. It is the seat of the Massachusetts Hospital for Epileptics. Pop. (1910) 8,610; (1920) 9,896.

PALMER, A. MITCHELL, Attorney-General of the United States. Born in Pennsylvania in 1872; graduated from Swarthmore College in 1891. Admitted to

A. MITCHELL PALMER

the bar in 1893, and practiced law in his home town of Stroudsburg, Pa. In 1909 he was elected Congressman on the Democratic ticket from the 26th Pennsylvania District, and held that office until 1915. On the outbreak of war with Germany President Wilson appointed Palmer Alien Property Custodian, an office which he held until he resigned to become Attorney-General of the United States in 1919. During the major part of his term as Attorney-General he has been occupied in investigating and halting the various "Red" activities in the United States. Attorney-General Palmer directed the fight made by the Government to reduce the high cost of living by prosecuting profiteering wherever it showed itself. When the coal miners struck in 1919 the Attorney-General had the United States Court at Indianapolis issue an injunction compelling the strike leaders to recall their order. This action was bitterly assailed by the leaders of the American Federation of Labor and by union men generally. Early in 1920 Mr. Palmer announced himself a candidate for the Democratic nomination for President to succeed President Wilson, but failed of nomination.

PALMER, ALICE FREEMAN (1855–1902). An American educator and a leader in the movement for the higher education of women. Born in New York State, she graduated from the University of Michigan in 1876. After teaching in the schools of Wisconsin and Michigan, in 1879 she became professor of history in Wellesley College and three years later became president. Under her leadership Wellesley attained the front rank of women's colleges in America. In 1887 she married George Herbert Palmer, a professor in Harvard University. From 1892 until her death ten years later she was associated in a non-resident capacity with the University of Chicago.

PALMER, FREDERICK, an American newspaper correspondent and writer, born at Pleasantville, Pa., in 1873. Graduated from Allegheny College in 1893, he engaged at once in newspaper work. He was for several years London correspondent and in 1897 was correspondent for several papers in the Greek War. He was in the Philippines in 1897-1898 and accompanied the expedition for the relief of Peking in 1900. He took part in the Russo-Japanese War for several papers. Following this he accompanied the forces to the Balkan War, in 1912, having in the meantime carried on investigations in Central America. He was a credited correspondent of the American Press with the British Army and Fleet, serving in 1914 and 1916. He was appointed official reporter with the American Expeditionary Forces with the rank of major in 1917,

and served as such during the war. He wrote two books covering the World War, "My Year of the War" (1915); and "My Second Year of the War" (1917); "America in France" (1918); "Our Greatest Battle" (1919). He contributed many articles on the war and on other subjects to leading periodicals.

PALMER, GEORGE HERBERT, an American educator; born in Boston, Mass., March 19, 1842; was graduated at Harvard in 1864; studied at the University of Tübingen 1867–1869; was assistant Professor of Philosophy at Harvard in 1883–1889; and in 1889 became Professor of Natural Religion, Moral Philosophy and Civil Polity there. He wrote "The New Education" (1887); "Life and Works of George Herbert" (1905); "Life of Alice Freeman Palmer" (1908); "Trades and Professions" (1915).

PALMER, JOHN McAULEY, an American lawyer; born in Eagle Creek, Scott co., Ky., Sept. 13, 1817. In 1839 he was admitted to the bar, and in 1843 was elected probate judge of Macoupin co., Ill.; in 1847 was elected a member of the constitutional convention, and in 1849 county judge of Macoupin co. He was elected to the State Senate in 1852, and 1854. He presided over the Republican State Convention in 1856. He made an unsuccessful canvass for Congress in 1859; elector on the Lincoln ticket in 1860. In 1861 he was State delegate to the peace congress in Washington. He entered the army in 1861, retiring in 1866 with the rank of Major-General, U. S. A. He then settled in Springfield, Ill. In 1868 he was elected the 16th governor of Illinois, and served four years from January, 1869. In 1872 he returned to the Democratic party and supported Greeley for President. He was nominated by the Democrats in the Legislature in 1877 and twice afterward as their candidate for United States Senator, without however, being elected; was delegate-at-large to the National Democratic convention in 1884, and was nominated by the Democratic State convention for governor in 1888 and defeated. In 1896 he was the candidate of the Gold Democrats for President of the United States. He died Sept. 25, 1900.

PALMERSTON, HENRY JOHN TEMPLE, VISCOUNT, an English statesman; born in 1784. In 1807 he was named a lord of the Admiralty under the Tory administration of the Duke of Portland. In 1809 he was appointed Secretary of War, and remained in the office nearly 20 years. His political views having changed, he retired from Wellington's administration in 1828. Resumed his work in the Foreign Office the following year, after the fall of the Peel ministry. He became famous as foreign minister in the six years of office. Was appointed Foreign Secretary in the Whig administration of Lord John Russell. Serious differences with his colleagues over Napoleon's coup d'état, forced his resignation. On the accession of the Coalition Administration in the following year, he took the office

LORD PALMERSTON

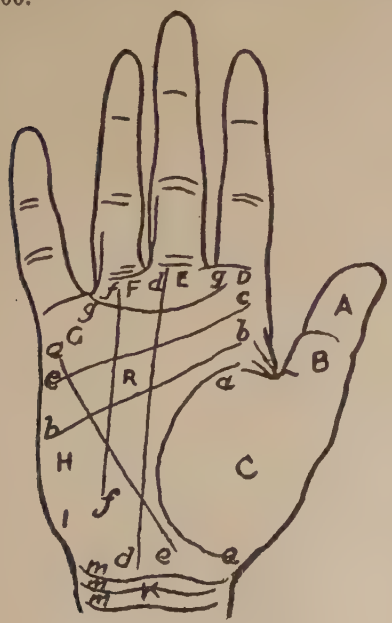
of Home Secretary. The mismanagement of affairs in the Crimea caused the fall of the Coalition ministry in 1855; immediately after which Lord Palmerston reached the apex of power as First Lord of the Treasury, and prime minister of Great Britain. As prime minister he successfully carried out the policy of alliance with France and the war with Russia which ended with the fall of Sebastopol, in September, 1855. Feebly supported, however, by his colleagues, he lost strength in the House, and his administration finally fell, February, 1858, on the Conspiracy Bill. The second Derby administration succeeded, but a year later Palmerston was again called to be prime minister. With surprising

energy and industry, he directed the English policy through the Italian War, the American War, and the Polish insurrection. He died Oct. 18, 1865.

PALMETTO, a fan palm growing in the West Indies, Bermuda, and the S. part of the United States. Its leaves are woven into hats, like those made of chip. The trunks form good stockades, and were used for the purpose during the War of Independence. Also *Chamærops humilis*, a palm from southern Europe.

PALMETTO STATE, South Carolina. On its coat of arms is a delineation of one of these trees, for the growth of which the State is famous.

PALMI, a town of Italy in the province of Reggio di Calabria. It is on the slope of Mount Elia. It is in the midst of a grape producing region. Olives and oranges are also grown in abundance. There is an excellent harbor which affords good fishing. Pop. about 15,000.



LINES OF THE PALM

A, will; B, logic; C, mount of Venus; D, mount of Jupiter; E, mount of Saturn; F, mount of Apollo; G, mount of Mercury; H, mount of Mars; I, mount of the Moon; K, the rascette; a, a, line of life; b, b, line of the head; c,c, line of heart; d, d, line of Saturn or fate; e, e, line of liver or health; f, f, line of Apollo or fortune; g, g, the girdle of Venus; R, the quadrangle; m, m, m, bracelets of life.

PALMISTRY, or **CHIROMANCY**, the art which professes to discover the temperament and character of anyone, as well as the past and future events of his life, from an examination of the palm of his hand; and of the lines traced upon it. The other branch of this general science has been called Chirognomy, and is concerned with the interpretation of the form and character of the hand and fingers, while chiromancy treats of the palm only.

PALM OIL, palm butter; a fat obtained from the fruit of certain kinds of palm, and imported from the coast of Guinea. It has the consistence of butter, an orange color, a smell resembling violets, and consists mainly of tripalmitin, with a little olein. Palm oil is extensively used in the manufacture of soap and candles, and is a common constituent of railway-carriage grease. It is frequently adulterated with wax, tallow, lard, resin, etc.

PALM SUNDAY, the Sunday immediately preceding Easter. It commemorates the triumphal entry of Jesus into Jerusalem, when the multitude strewed palm "branches," or rather leaves, for the typical palms, like those of Palestine, have no branches (John xii: 13).

PALMYRA, an ancient city, in a fruitful and well-watered oasis of the Syrian desert. It was the Tadmor or Thadmor of the Hebrews, founded, or enlarged by Solomon, about 1001 B. C. Both its Greek name Palmyra, and its Hebrew name Tadmor, signify the city of palms, and the Arabs call it Tedmor. It submitted to the Emperor Hadrian in 130, after having repelled Marc Antony about 58 B. C., and rose to its highest power in the 3d century. Sapor I., King of Persia, was defeated here by Odenathus in 262. Odenathus was murdered about 267, and his wife Zenobia assumed the title of Queen of the East. Her army having been defeated at Antioch and at Emesa, Zenobia was besieged in her capital by the Emperor Aurelian in 272. She was taken prisoner, and Palmyra surrendered in 274. The citizens slew the Roman garrison, and Aurelian destroyed Palmyra. It was restored by Justinian I. in 527, and again destroyed by the Saracens in 744. It was plundered by Tamerlane in 1400. It had an immense temple dedicated to the sun, of which 60 columns out of 300 still remain.

PALNI HILLS, a range of southern India, linking the S. extremities of the Eastern and Western Ghâts; average height of the higher ridge, 7,000 feet.

PALO ALTO, the name of a plain in southern Texas, 8 miles from Browns-

ville, where the first battle of the Mexican War was fought, May 8, 1846. Gen. Zachary Taylor was in command of the United States troops of 2,300 men, while the Mexicans, under General Arista, had about 3,500. The battle was fought principally with artillery and the Mexicans were defeated.

PALOLO (*Palolo viridis*), an edible annelid, allied to the lug worm, extremely abundant at certain seasons in the sea above and near the coral reefs which surround many of the Polynesian Islands. The body is cylindrical, slightly tapering at both ends, divided into nearly equal joints, each joint with a small tuft of gills on each side. In thickness the palolo resembles a very fine straw; in length it varies from 9 to 18 inches. These annelids made their appearance in great multitudes, apparently rising out of the coral reefs. They are eagerly sought after by the islanders. They often occur in such numbers that they may be grasped by handfuls. After sunrise the creatures break into pieces and the shoals are not seen till the next period; the two stated periods being in October and again in November.

PALPITATION, a sensible abnormal beating of the heart, most frequent in adolescents, particularly females, and in advanced life, indicating want of power and laborious efforts rather than increased excitement and action. It is frequently associated with dyspepsia, and morbid states of the heart.

PALSY, the loss of the power of motion. It is a symptom of disease, usually of apoplexy. The two causes on which it depends are an affection of a nerve or nerves, or a morbid state of the nervous centers, the brain or spinal cord. Under the former head poisoning of nervous matter or any morbid process impairing the nerves or solution of continuity, or pressure may cause it; under the latter, it is due to a morbid state of the centers of the nervous system. The commonest form is hemiplegia, a paralytic stroke on one side or half, which may be complete, profound, or incomplete. There are six forms: Cerebral, spinal, epileptic, choreic, hysterical, and peripheral, their frequency being in the order named. Palsy is uncommon but serious in the young, and most common in advanced life. There are four modes of termination: (1) Death; (2) complete recovery with wasting muscles; (3) partial recovery with rigid muscles; (4) complete recovery. In hysterical hemiplegia the lower limb, instead of being dragged by a rotary movement, is usually dragged straight forward.

PALTSITS, VICTOR HUGO, an American historian, born in New York in 1867. He was educated in public and private schools in New York and took a scientific course at Cooper Institute. He also studied European and other languages. For many years he was assistant of the New York Public Library. He was appointed State historian in 1907, serving until 1911. In 1914 he was appointed keeper of manuscripts in the New York Public Library and in 1916 became chief of the Division of American History in the same institution. He was a member of many historical societies and was a prolific writer on historical subjects, and edited a large number of historical works and contributed largely to encyclopædias on historical subjects.

PAMIRS, THE, ("roof of the world") the name given to that part of central Asia where the frontiers of Russia, China, and Afghanistan adjoin. It forms the nucleus of the central Asiatic highland system, uniting the Himalaya and the mountains of the Tian Shan range with the Hindukush, and is traversed by a number of mountain ridges interspersed with broad valleys, the average altitude of the intervening table lands being 13,000 feet. It was traversed by Marco Polo and in recent years has been visited and described by Lord Dunmore, Lord Curzon, Col. T. E. Gordon, Mons. Bonvolet, Maj. C. S. Cumberland, Captain Younghusband and Sven Hedin.

The term pamir implies a mountain valley of glacial formation. During the brief summer these valleys are strewn with patches of grass, which serve as pasturage for the herds of the nomadic Kirghiz, while for the rest of the year the whole of the pamirs are covered with snow. The pamirs contain much game. The only population existing in the region are Kirghiz of the lowest type In 1895 the Russo-Afghan border line across the pamirs was settled by a convention drawn up by an Anglo-Russian boundary commission. The Russian-Chinese frontier was not, however, affected by this convention, the only understanding existing being that entered into between Russia and China in 1894, by which Russia undertook never to interfere with that portion of the pamirs occupied by China. In 1899, however, the Russians manifested a desire to annex Sirikul, a province of the Kirghiz, and to break their treaty with China.

Their trade through the pamirs is quite large and constantly growing.

PAMLICO, a tribe of Indians living on the Pamlico river, in Beaufort co., N. C. They were greatly reduced in numbers by the smallpox in 1696, and by the Tuscarora War of 1711. Those left were absorbed in the Tuscarora tribe.

PAMLICO SOUND, a shallow lagoon of the United States, on the S. E. coast of North Carolina. It is 80 miles long, from 8 to 30 miles wide, and separated from the ocean by long, narrow, sandy islands.

PAMPAS, properly treeless pasture land covered with grass, but used more comprehensively for the whole table-land of South America, from the boundary of Brazil, where the regular seasons of the tropics cease, across the states of La Plata and Patagonia nearly to Cape Horn. It may be divided into three botanical zones: the Interior Northwestern Chanar-steppe, the True Pampas, and the Southern Plains of Patagonia.

PAMPAS GRASS (*Gynerium argenteum*), a grass which grows in the pampas in the S. parts of South America. It has been introduced into Europe as an ornamental plant.

PAMPEAN FORMATION, a formation deposited and upheaved since the present Atlantic mollusca have been brought into existence.

PAMPELUNA, or **PAMPLONA**, a fortified city of Spain; on a tributary of the Ebro; 111 miles N. W. of Saragossa. It has a citadel (a copy of that of Antwerp), a Gothic cathedral (1397), a viceregal palace, a fine aqueduct, a natural history collection, a college of surgery, and a bull ring, manufactures of pottery, leather, cloth, hardware, etc., and a trade in wine. It was called by the ancients Pompeiopolis, because built by Pompey in 68 B. C. It was taken by the Goths in 466, by the Franks in 542, and by Charlemagne in 778. From 907 it was the capital of Navarre. It was during the siege by the French in 1521 that Loyola received his wound. The town was seized by the French in 1808, and held by them till 1813, when it was captured by Wellington. It again capitulated to the French in 1823. In the Carlist wars it was held by Queen Christina's adherents from 1836 to 1840, and in 1873–1876 it was vainly attacked several times by the Carlists. Pop. (1917) 30,779.

PAMPHYLIA, anciently a country on the S. coast of Asia Minor, with Cilicia on the E. and Lycia on the W. It was originally bounded on the inland or N. side by Mount Taurus, but afterward enlarged, so as to reach the confines of Phrygia. Pamphylia is mountainous, was formerly well wooded, and had numerous maritime cities. The inhabitants were a mixed race of aborigines, Cilicians, and Greek colonists.

PAMUNKEY, a small river in Virginia formed by the union of the North and South Anna. It unites with the Mattapony at West Point to form the York river. In conjunction with the South Anna it is over 100 miles in length.

PAN

PAN, in Greek mythology, the god of shepherds, of huntsmen, and of all rural inhabitants. He was the son of Mercury, and was a monster in appearance, having two small horns in his head, a ruddy complexion, a flat nose; and his

legs, thighs, tail, and feet were like those of a goat.

PANAMA, a republic of Central America, between Costa Rica and Colombia, bounded on the S. by the Pacific Ocean and on the N. by the Caribbean Sea. Its extreme length is about 480 miles, with a breadth varying from 37 to 110 miles. Its total area is 13,380 square miles. The population in 1912 was 336,742, excluding the Canal Zone. The population for 1920 was given as 401,428. The inhabitants are a mixed race, comprising Spaniards, Indians, and negroes. The republic is divided into eight provinces. The Canal Zone, over which the United States has sovereign rights, by treaty, is a strip of territory extending to a width of 5 miles from either side to the middle of the Panama Canal, and excluding the cities of Panama and Colon. It has an area of 474 square miles.

Production.—The soil of Panama is exceedingly fertile. Only about one-eighth is under cultivation. The most important product is the banana. Caoutchouc is collected by the Indians or is obtained from trees planted by Europeans near the cost. About 130 tons is produced annually. Coffee is grown at Chiriqui to the amount of 500,000 pounds per year. The raising of cocoa is of some importance. The other products of the soil are cocoanuts, mahogany and other woods, sugar, and tobacco. The production of sugar is 40,000 quintals. For the most part the industries of the republic are not developed.

Transportation.—There are about 200 miles of railway open to traffic, including the Panama railway, which crosses the Isthmus, connecting Panama with Colon. There is communication on both sides between the Isthmus and American and European countries. Traffic with Panama and Colon is carried on through the ports of the Canal Zone. The total imports in 1918 were valued at about $8,000,000, and the exports at about $5,000,000. Practically all the imports came from the United States, and the remaining portion from the United Kingdom, from China, Japan, France, and Spain.

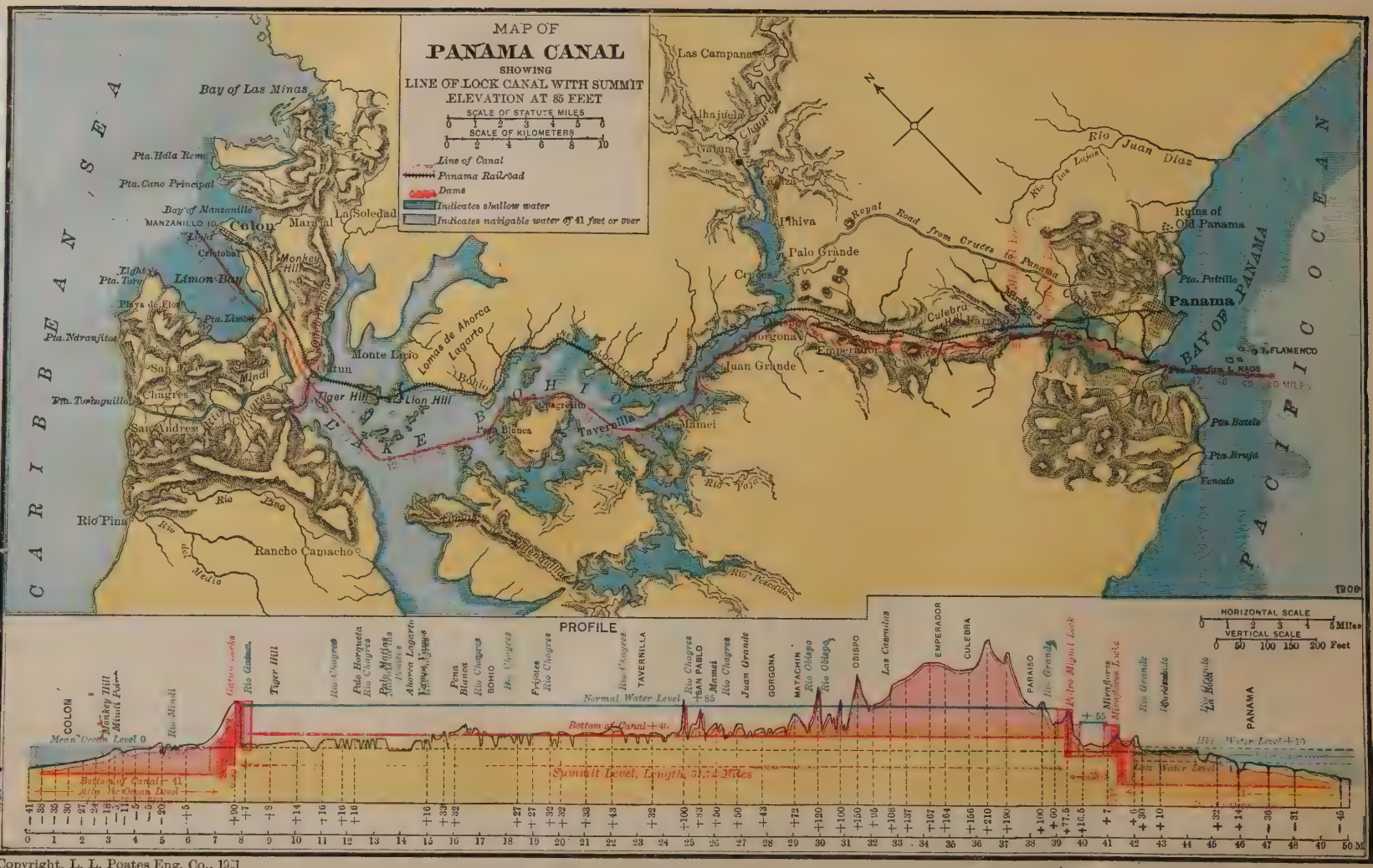
Finance.—Gold is the standard of currency and the unit is the balboa, which is equivalent to the United States dollar. For the two-year period, Jan. 1, 1917, to Jan. 1, 1919, the budget balanced at $7,189,170. The two years' budget for 1919–1921 was estimated at $7,220,474.

Government.—The executive power is in the hands of a president, three vice-presidents, and a cabinet of five ministers. There is a National Assembly of 31 members, one for each 10,000 inhabitants. Each of the provinces has a governor. The constitution was adopted on Feb. 13, 1904, and was amended on Dec. 26, 1918. The president is elected for a term of four years by direct vote, and is not eligible for re-election.

History.—Panama, until 1903, formed a province of Colombia. On Nov. 3 of that year a bloodless revolt secured its independence as an independent republic. The action of Panama in acquiring independence was supported by the United States. The first president, Manuel Amador Guerrero, was elected in 1904. Largely as a result of its proximity to the Canal Zone, Panama has enjoyed peace and prosperity. The American Government practically remade the cities of Panama and Colon, so improving the sanitation that these cities from being among the most unhealthy in the world, are now among the most healthful. Panama followed the United States in the declaration of war against Germany on April 7, 1917. In 1919 a general population census was ordered to be held in 1920. Dr. Belisario Porras was elected president for a third term, and assumed office on Oct. 1, 1920. A boundary dispute with the neighboring republic of Costa Rica was settled in 1921 by the arbitration of the United States.

PANAMA, a city of the republic of Panama, capital of the State of the Canal Zone, on the Gulf of Panama and on the Pacific coast of the Isthmus of Panama. The city lies on a tongue of land, across which its streets stretch from sea to sea. The harbor is shallow, but affords secure anchorage. Panama is chiefly important as the terminus of the interoceanic railway and also of the PANAMA CANAL (*q. v.*). The railway, which has been in operation since 1855, runs across the isthmus from Panama to Colon or Aspinwall on the Atlantic, and accommodates a large traffic. Pop. about 65,000.

PANAMA-CALIFORNIA EXPOSITION. This exposition, held at San Diego, Cal., during the entire year of 1915, was in celebration of the completion of the Panama Canal. The work of preparation took over three years, and the commemorative buildings reproduced the Moorish architecture of Spain, and the Spanish colonies of America. The groups of buildings, divided by streets shaded in the Spanish style, with cathedral and theaters, and palaces, studded with parks and lakes, covered 612 acres,



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and the initial capital expended was $2,250,000. The exhibits were representative of the various arts and sciences, with particular reference to those especially distinctive of California and Spanish America. Round the Isthmus were gathered various amusements, and nearby was the Painted Desert, with cliff dwellings and Pueblo Indians from Arizona. During its course the Exposition was visited by many millions of sightseers from all over the United States and from other countries.

PANAMA CANAL. The Panama Canal was opened to navigation Aug. 15, 1914. It was a colossal work and the difficulties met in its construction were almost insuperable. The project of joining the Atlantic and Pacific had existed for centuries, and it was one of the companions of Balboa who first broached the idea. The plan first took tangible form when the French began actual work on Jan. 20, 1882. The work was under the direction of Count Ferdinand de Lesseps, who had achieved fame as the builder of the Suez Canal. A terrific scandal arose, however, when the work had only gotten fairly under way, fraud and embezzlement were charged, and the company went into the hands of a receiver in 1889. The receivers resumed work in 1894 and continued until May 4, 1904, when the United States Government undertook to complete it. The rights of the French were bought for $40,000,000. The Republic of Panama ceded to the United States a strip of land five miles wide on either side of the Canal in consideration of $10,000,000. After ten years of work and the expenditure of over $300,000,000, the work was completed and the Canal opened for traffic in 1914.

The Canal crosses the Isthmus of Panama at very nearly its narrowest point. From deep water in the Atlantic to deep water in the Pacific is 43.8 nautical miles. The minimum depth of the Canal is 41 feet. Starting on the Atlantic side at Limon Bay, the sea-level extends 5.7 miles to Gatun. Here there are three pairs of locks that lift the vessel to Gatun Lake, 85 feet above sea-level. The vessel proceeds along this through the famous Culebra Cut to Pedro Miguel Lock and Dam, where it is lowered to Miraflores Lake, which is 55 feet above sea-level and about a mile long. At its southern end are the Miraflores Locks, which lower the vessel to the level of the Pacific, and from there a channel seven miles long carries the vessel past Balboa and into the ocean. The locks are miracles of engineering construction. Their chambers have a width of 110 feet and a length of 1,000 feet, which makes them capable of handling the largest ships yet built. In connection with the building and operation of the Canal, there are great terminals at both entrances, with docks, warehouses, foundries, repair shops, and all the adjuncts of great commercial ports.

GATUN LOCK, PANAMA CANAL

Receipts from tolls average over $6,250,000 annually. The Panama railroad practically parallels the Canal from Colon to Panama on the east side. There was more traffic through the Canal in 1919 than in any year since it was opened, and the receipts for the fiscal year that ended June 30, 1919, exceeded operating expenses by $241,822. Two thousand, three hundred and ninety-six ships with a total tonnage of

7,128,000 passed through the Canal. These were, according to nationality: United States, 786; British, 602; Belgian, 1; Canadian, 2; Chilean, 93; Chinese, 4; Colombian, 1; Costa Rican, 12; Danish, 79; Dutch, 19; Ecuadorian, 1; French, 104; Greek, 3; Japanese, 87; Mexican, 1; Panamanian, 128; Peruvian, 65; Russian, 3; Spanish, 5; Swedish, 29; Salvador, 1. The entire investment of the United States in the Canal up to June 30, 1919, was $365,416,000. The governor of the Canal Zone in 1921 was Colonel Jay J. Morrow.

PANAMA HATS, very fine plaited hats made from the fan-shaped leaves of *Carludovica palmata*, a dwarf palm tree which grows in Peru, Ecuador, Colombia, and Venezuela, and is called *Jipijapa* in Central America.

PANAMA, ISTHMUS OF, formerly called the Isthmus of Darien, has a breadth of from 30 to 70 miles, connects North with South America, and separates the Pacific from the Atlantic. The coast is low and swampy along the Caribbean Sea, but less unwholesome along the Pacific.

PANAMA-PACIFIC EXPOSITION, Exhibition held in San Francisco in 1915, contemporaneously with the fair at San Diego, and with a like object, namely the celebration of the completion of the Panama Canal. A total of $20,500,000 was raised for the purpose, but the initial cost was estimated to have exceeded twice that figure. The buildings included twelve great palaces, and around these were the pavilions of the various States of the Union and of foreign nations, with race track, thoroughfares, drill and pleasure grounds alternating. The preliminary work took nearly four years and the area covered 635 acres. The Court of the Universe, with sunken gardens, formed the core of the exposition, having decorative features representative of the different nations of the world. The Arch of the Rising Sun, the Court of Abundance, the Court of the Four Seasons, the Tower of Jewels, the Palace of Fine Arts, the palaces of mines, metallurgy, machinery, transportation, horticulture, education, and manufactures, formed a wonderful ensemble. The pieces of statuary ran into thousands. Over eighty different States and nations participated and sent exhibits.

PAN-AMERICAN CONFERENCE, an assemblage of delegates from all the governments of South and Central America, convened at Washington in 1889–1890, at the instance of James G. Blaine, then Secretary of State. The conference had for its immediate object the furtherance of international comity and commerce among the races of the American continent. The sittings were protracted for nearly six months, the delegates meantime visiting every city of importance in the United States. The conference possessed no legislative or executive functions, its duties being purely advisory. The definite recommendations included a coinage of uniform weight and fineness, a common method of legalization of documents, the metrical decimal system, and a uniform system of weights and measures, regulation of the fees of consular agents, and certain conveniences of method in customs administration. Other important propositions were unanimously adopted, such as a great N. and S. trunk railway; government subsidies for steamship lines connecting the American countries represented; uniform protection for literary and art property, trade marks, and patents; uniform quarantine regulations; a uniform extradition treaty; and a great international bank.

The second conference, in response to an invitation issued during the previous year by the Mexican Government, met in the City of Mexico, Oct. 22, 1901. A third conference was held at Rio de Janeiro in 1906, and a fourth at Buenos Aires in 1910. There were delegates from 19 states.

PAN-AMERICAN EXPOSITION, a fair held in Buffalo, N. Y., from May 1 till Nov. 3, 1901. It was distinctively an American exposition, the exhibits from the various States of the Union and of South and Central America being unusually full. The buildings were made of staff tinted a soft greenish-blue. Power for the electrical exhibit, the finest ever given, was derived from Niagara Falls. Over 5,000 horse power, and 200,000 incandescent lamps were used. The electric tower alone had 44,000 electric lights on its sides. Financially the exposition was a failure, due largely to the setback the exposition received at the time of President McKinley's assassination, which caused a temporary closing. The total cost of the exposition was $8,860,757.20; the total receipts were $5,534,643.

PAN-AMERICAN SCIENTIFIC CONGRESS. The second meeting of the Pan-American Scientific Congress was held in Washington, D. C., from Dec. 27, 1915, to Jan. 8, 1916. The meeting, which resulted in the exchange and advancement of new ideas and views in the scientific and educational world in the Pan-American aspects, was held for the advancement of civilization. Eduardo

Suarez, Chilean Ambassador to the United States, presided over the meeting, which was largely attended by public men, scientists and educators of American countries.

The discussions covered almost the entire range of human activity and progress. To facilitate progress, the congress was divided into 9 sections, which were in turn divided into 45 subsections, and the various phases of the matters under discussion were considered by the proper sub-sections or group meetings.

Elihu Root delivered a notable address before the Congress, asking protection for the weaker nations by the adoption of international rules of conduct. On Jan. 6, 1916, Woodrow Wilson urged a plan proposed by Robert Lansing, Secretary of State, on an agreement between all American nations which would guarantee the independence and territorial right of each party to the agreement, and provide for the settlement of all disputes by arbitration.

The members of the Congress were guests at a banquet given by Secretary of State Lansing on Jan. 8.

The next meeting of the Congress will be held in Lima, Peru, in 1921, the time of the celebration of the centennial of Peruvian independence.

PAN-AMERICAN UNION, the official international organization of the 21 independent governments of the western hemisphere. It was originally organized as the Bureau of the American Republic, and was founded at the first Pan-American Conference held in Washington in 1889-1890, and was continued through the second, third and fourth conferences. The name was changed to the Pan-American Union at the latter conference held in Buenos Aires in 1910. The organization is supported by the governments and is controlled by a governing board, composed of the Secretary of State of the United States, and the diplomatic representatives of the other American governments in Washington. The Union has a handsome building in Washington. It publishes the Pan-American "Bulletin" and a number of other reports and papers. The chief of this organization was John Bassett, who acted as its president until 1920, when he was succeeded by Dr. Leo S. Rowe. The Union has charge of the Pan-American conferences which are held periodically and are attended by representatives from the American countries. See PAN-AMERICAN CONFERENCE.

PANAY, one of the Philippine Islands, belonging to the Visayan group. The island in shape is nearly that of a triangle. In general it is mountainous, though there are many extensive and very fertile valleys. The island comprises the three provinces of Capiz, Iloilo, and Antique; area, 4,611 square miles; pop. about 750,000. It is celebrated for forest products, there being in the single province of Capiz as many as 87 varieties of excellent building woods. From the forests are also gathered honey, wax, and pitch. Several quarries are worked, producing fine marble and tonalite. Lime of an excellent quality is abundant in the province of Iloilo. Besides these industries, cotton, corn, chocolate, pepper, coffee, tobacco, sugar cane, and rice are cultivated with much success.

PANCRAS, ST., the son of a heathen noble of Synnada in Phrygia, lost both parents while a boy, and was taken to Rome by an uncle, and there baptized, but immediately afterward was slain (304) in the Diocletian persecution, being only 14 years old. The first Church that St. Augustine consecrated in England was dedicated to St. Pancras; it stood at Canterbury.

PANCREAS, in anatomy, an organ situated within the curve formed by the duodenum; its main duct opening into the intestine there, and secreting the pancreatic fluid, which resembles saliva, the gland itself resembling the salivary glands. Its function is to secrete this fluid which has a strong digestive action on starchy matter, and in a less degree on fatty matters and albuminoid substances.

PANCREATIN, a mixture of ferments, or enzymes, obtained from the pancreas of the ox or hog. Occurs as a yellowish, amorphous powder, or as transparent yellowish scales, almost completely soluble in water and insoluble in alcohol. When exposed to the air it absorbs water and loses its activity. Pancreatin has the property of bringing starchy, proteid and fatty foods into a more digestible form. This renders it valuable for treating digestive disorders, and cases where defective nutrition is indicated. It is also used in treating diabetes and cancer. In conjunction with sodium bi-carbonate, it is used in peptonizing milk for feeding infants, and is also added to beef tea, gruel and other invalid foods.

PANDECTS, a collection of laws, systematically arranged, from the works of Roman writers on jurisprudence, to which the Emperor Justinian gave the force of law, 533 A. D.

PANDIT, or **PUNDIT**, a learned Brahman; one versed in the Sanskrit

language, and in the sciences, laws, and religion of the Hindus.

PANDORA, the first mortal female, according to Hesiod. She was made by Vulcan out of clay, at the command of Jupiter, who wished to punish the impiety of Prometheus by giving him a companion. When the statue was animated, each god and goddess bestowed on her some special charm or attribute, beauty, grace, music, wisdom, fascination, and eloquence; while Jove himself presented her with the "Pandora's box," full of secret wonders, which could be only opened by the mortal she selected for her husband. Mercury carried her to earth, and presented her to Prometheus, who refused her. His brother, however, asked for and obtained Pandora for his wife, upon which she presented him with the casket. When Pandora opened the lid, a host of evils flew out and spread themselves over the world; and the consequences would have been still more fatal, had there not been Hope at the bottom, to ameliorate the pains and sufferings of life.

In zoölogy, a genus of bivalve mollusks, having unequivalved shells, and found at a considerable depth in the sandy shores of Europe and of the Pacific Ocean. In astronomy, an asteroid, discovered by G. Searle in 1858. In music, a kind of lute, furnished with strings of brass.

PANDOURS, a people of Serbian origin who lived scattered among the mountains of Hungary, near the village of Pandour, in the county of Sohl. The name used to be applied to that portion of the light armed infantry in the Austrian service raised in the Slavonian districts on the Turkish frontier. They originally fought after the fashion of the "free-lances," and were a terror to the enemy.

PANGBORN, GEORGIA WOOD, an American writer; born in Malone, N. Y., in 1872. Graduated from Packard Institute in 1894, and in the same year married H. L. Pangborn. She wrote "Roman Biznet" (1902); "Interventions" (1911). She was a frequent contributor to magazines.

PAN-GERMANISM, a movement among German nationalists and imperialists, embodying the idea that all German-speaking peoples should be united into one dominating empire. For long only an ideal, it finally found concrete expression in the formation of the Universal German League in 1891, which in 1894 changed its name to the Pan-German League. In the propaganda of the more enthusiastic leaders of this organization was expressed the idea which gradually prepared the German people to support the military plans of the Imperial Government when, in 1914, it precipitated its great war of world conquest. In 1903 the League formulated its program into the following main points:

(1) Intensification of patriotic education, and bitter opposition to all the ideas of "world brotherhood," advocated by the Socialists;

(2) To Germanize more thoroughly the public school system, by removing all sources of instruction detrimental to the Pan-German idea;

(3) To support all German minorities in other European countries, to keep alive their race consciousness and to give them all possible aid in fighting for political power that eventually all these units might unite and make a German-ruled Europe;

(4) To foster German influence and culture in over-seas colonies.

In 1902 the League had enrolled 22,000 members, by which time it was carrying on a tremendous propaganda. During the war it was generally taken for granted that the Pan-German League worked closely hand in hand with the Imperial Government, but it is doubtful whether the connection was any closer than between any ultra-patriotic society and the government of any country during war time. That military conquest was the idea of a majority, or even of any large minority, of the League members, is doubtful. A peaceful penetration of the civilized world by German "culture" was the openly expressed desire of the majority. The Pan-German League still wields some influence, even under the Republic. It is naturally strongly anti-Socialistic.

PANGOLIN, in zoölogy, scaly anteater; the popular name for any indi-

PANGOLIN

vidual of the genus *Manis*. They range in size from one foot to three feet in length, exclusive of the tail, which, in some species, is twice as long as the

body; legs short, ears very small, tongue long and vermicular, to which ants are held fast by the copious flow of saliva with which it is lubricated. There are seven species.

PANIC, a sudden flight or alarm, especially one without any real cause or ground; sudden flight or terror inspired by some trifling cause. A commercial panic, a panic produced in commercial circles. When such a panic takes place a run commences on the banks, the price of securities falls, and other abnormal commercial conditions ensue.

PANICLE, in botany, a kind of inflorescence, in which the flowers are arranged on the lengthened axis, with branched peduncles and lengthened centripetal clusters of flowers.

PANIPAT, a town of the Punjab, India; 53 miles N. of Delhi, near the old bank of the Jumna, and on the great military road of northern India between Afghanistan and the Punjab. The first great battle of the Panipat was fought in 1526, when Baber, at the head of 12,000 Mongols, defeated the army, 100,000 strong, of the Emperor of Delhi. The second in 1556 by the Mongols under Akbar, grandson of Baber, and third of the Mogul emperors, against Hemu, an Indian general of the Afghan Sher Shah, the latter being defeated. The third battle was fought Jan. 7, 1761, between Ahmed, ruler of Afghanistan, and the till then invincible Mahrattas, suffered a total defeat and great slaughter. Manufactures copper utensils, cloth, blankets, hardware, silver and glass ornaments. Pop. about 35,000.

PANKHURST, CHRISTABEL, daughter of Emmeline Pankhurst; born in 1882, at Manchester, where she graduated in 1906 from Victoria University as LL. B. She seconded her mother's militant tactics in the work for women's suffrage in Great Britain, and from 1905 onward addressed public meetings, and heckled cabinet ministers with the result that she was frequently imprisoned. In 1912 she fled to Paris, and from there edited the "Suffragette." She lectured in the United States in 1914-1915, and wrote a book, "The Great Scourge and How to End It." In 1919 she made an unsuccessful attempt to get in Parliament. In 1920 she visited Russia, and spoke in sympathy for the Bolshevist Government.

PANKHURST, EMMELINE (née **GOULDEN**), English suffrage leader. She was born in 1858 at Manchester, England, and in 1879 married Dr. Richard M. Pankhurst, who died in 1898. She had always worked for woman's suffrage, but first came into prominence at the elections of 1906, when she and other women endeavored to break up public meetings and to fire public buildings. As a result of these activities she and other suffragettes were sent to jail, but they resorted to the hunger strike and had to be released. In 1913 she escaped to lecture in the United States, and when the war broke out ended militant tactics and aided the government. The result was the admission of women to the vote at the close of the war, a measure for which Mrs. Pankhurst received the chief credit. In 1919-1920 she again visited the United States.

PANNONIA, a large extent of country in Europe, bounded on the N. by the Danube, S. by Illyricum and Mœsia, E. by the Danube, and W. by Noricum, inhabited by Celtic tribes and including the parts now known as Hungary and the Republic of Austria. It was attacked by the Romans, under Octovianus, 35 B. C., and made a Roman province by Tiberius in 8. It was ceded to the Huns by Theodosius II. about 447, came into the hands of the Ostrogoths at the death of Attila in 453, and to the Longobardi (527-565), from whom it passed to the Avari in 568. The Ungri, or Hungarians, settled here in 889; and from them a large part of Pannonia received the name of Hungary.

PANTELLARIA, a volcanic island in the Mediterranean, 36 miles in circumference, and lying 60 miles S. W. of the Sicilian coast. In the chief town (Pantellaria) is a great convict prison.

PANTHEISM, the view that God and the universe are identical. It was taught in India in the Vedantic system of philosophy, one of the six leading schools of thought, and to this day it is widely accepted, both by the instructed Brahmans and by the common people. In the latter part of the 12th century it was taught by Almaric of Chartres, a dialectician and theologian. Pope Innocent III. forced him to recant his views. By many Spinoza is considered to have revived pantheism, but his teaching in this respect has been misunderstood (see SPINOZA). In the pantheism of Schelling God is considered as the Absolute Being, revealing Himself in external nature and in human intelligence and freedom.

PANTHEON, a famous temple at Rome, built by M. Agrippa, son-in-law of Augustus, about 27 B. C., and dedicated to Mars and Jupiter the Avenger, in memory of the victory obtained by

Augustus over Antony and Cleopatra. The Pantheon is now commonly called the Rotunda, from its circular form. It was given to Boniface IV. by the Emperor Phocas, A. D. 609, and dedicated as a Christian church to the Virgin and holy martyrs, and in 830 Gregory IV. dedicated it to all the saints. It is the finest specimen of a circular building not surrounded by columns. The external diameter is 188 feet, and the height, exclusive of the flat dome surmounting the upper cornice, 102 feet, the dome being 36 feet high. The porch is octastyle, and is 103 feet wide. There is an excellent cast of the Pantheon in the Metropolitan Museum of Art, New York City. Also all the deities collectively worshiped by a nation; the divinities of a nation; and a treatise or discourse upon the collective body of deities of a nation.

PANTHER, one of the *Felidæ* or cat tribe, of a yellow color, diversified with roundish black spots, a native of Asia and Africa. The name panther (in vulgar language painter) is given to the puma in America.

PANTOGRAPH, or **PANTAGRAPH**, an instrument used in copying plans, maps, and other drawings, so that the copy may be either similar to, or larger, or smaller than the original. The pantograph is principally useful to the draughtsman in enabling him to mark off the principal points in a reduced copy, through which the lines may afterward be drawn by the usual methods of construction.

PANTOMIME, a theatrical representation, in which the entire plot is exhibited by gesticulations and scenic agency, without speeches or conversation. The ancient pantomime were persons who could mimic all sorts of actions and characters, and were first introduced on the Greek stage to imitate, by actions of feature, hands, and body, the substance or plot of what the chorus was singing; subsequently, they were employed as a sort of interlude to divert the audience after the chorus and actors had left the stage.

PAOLA, ST. FRANCIS OF. See FRANCESCO DI PAULA.

PAOLI, PASQUALE, a Corsican patriot, born in 1725. In 1755, being invited by the Corsicans to become their captain-general, he put himself at the head of his countrymen, and, during 12 years, waged a fierce war with the Genœse, who were in the end driven from almost every fort in the island. Genoa, however, gave up the island to France in 1765; and soon afterward a large force was landed, under the command of Count Marbœuf, against whom Paoli and his followers fought desperately. But the Corsicans being totally routed at Pontenuovo, the island submitted. Paoli went to England, where he remained till 1789, in which year, Mirabeau having moved in the National Assembly the recall of all Corsican patriots, Paoli repaired to Paris, and was created by Louis XVI. military commandant in Corsica. At the outbreak of the Revolution, he conceived a scheme for making Corsica an independent republic. He had been on the best terms with the Bonaparte family, but they now joined the Jacobin party, while he allied himself with Great Britain, favored the landing of 2,000 British troops in the island in 1794, and joined them in driving out the French. He then surrendered the island to George III., but becoming dissatisfied with the government, left the island in 1796, and went to London, where he died in 1807.

PAPA, a town of Hungary in the county of Vesprèm, on the Tapolcza river. It is about 60 miles S. E. of Presburg. It has several extensive palaces and a Protestant gymnasium. Before the World War the town was of considerable importance as a manufacturing center, its chief industry being the manufacture of pottery, tobacco and textiles. Pop. about 22,000.

PAPAL STATES. See CHURCH, STATES OF THE.

PAPAVERACEÆ, poppyworts; an order of hypogynous exogens, alliance Ranales. Herbaceous herbs or shrubs, often with milky juice. Poppyworts are narcotic, emetic, purgative, or acridly poisonous. Two thirds of the species are found in Europe, the others in Asia, Africa, Australia, and tropical America.

PAPAW (*Carica papaya*), a small South American tree of the natural order *Passifloraceæ* (formerly made the type of a small family, *Papayaceæ*), which has now been introduced into many tropical and subtropical countries. The fruit is eaten either raw or boiled. The juice of the fruit and the sap of the tree render tough meat tender, even the exhalations from the tree have this property, and joints of meat, fowls, etc., are hung among its branches to prepare them for the table. The *Chamburu* of Brazil is remarkable for the extremely acrid and poisonous character of its juice, and the disgusting stercoraceous odor of its flowers. In the United States the name papaw is given a small tree

of the natural order *Anonaceæ*, the fruit of which, a large oval berry, three inches long, with soft, insipid pulp, is eaten by negroes.

PAPE, ERIC, an American artist, born in San Francisco in 1870. Studied art in Paris and traveled and lived in England, France, Germany, Egypt, Mexico and other countries. He was the founder and director and instructor of the Eric Pape School of Art until 1913. He was a frequent visitor to European art expositions. He also designed many important monuments and illustrated many notable publications. He was a member of the Society of Arts and other associations of artists.

PAPER, a material made in thin sheets from a pulp of rags, esparto grass, straw, wood or other fibers, and used for writing or printing on, or for wrapping. The earliest paper was doubtless that made from the Egyptian papyrus, whence all similar writing material is named. Many books and newspapers have been printed entirely of one material, such as bamboo, straw, jute, *Phormium tenax*, maize leaves, esparto, etc. In Japan a species of mulberry osier is grown specially for its bark for paper making. Only two vegetable fibers have come into general use for paper making; these are esparto and wood pulp. The best sources of fiber are linen and cotton rags for white paper and hempen cordage for brown. A caustic soda or soda-ash is required in the preparation of many fibers.

Raw fibers may be divided into four classes: (1) that which is easily reduced and easily bleached; (2) that which is difficult to bleach; (3) that which is difficult to reduce but easily bleached; and (4) that wherein perfect bleaching effects the integrity of the fiber. The longer the fibers and the more intricate the mixture of them when wet, the stronger will be the sheet of paper when dry. The culms of various cereal grasses are employed where obtainable; rice straw in Asia, wheat, oat, and other kinds of straw in Europe. Straw was used a century ago for paper making, but its extensive use is of comparatively recent date. The deficiency in the supply of rags and the absence of any cheap substance to supplement esparto have led to a great run on wood pulp for the paper mills in most countries. Its manufacture and use dates practically back only to about 1870; indeed its general adoption may be referred to 10 years later. The conifers giving the strongest and toughest fiber seem to be best adapted for conversion into pulp, though many other species are used. The production has centered chiefly in America and the two Scandinavian countries, Norway and Sweden. They also make a large quantity of paper and pasteboard for export. Wood pulp is now the principal ingredient in cheap paper. It is deficient in fiber, but a moderate admixture of rags, esparto, or other fibrous material strengthens it. Much of the paper made is used up a second time. Cotton and linen rags are the mainstays of the paper maker, and all countries draw largely on these waste substances. In order to reduce the price many makers introduce into their pulp sawdust and various mineral matters, such as kaolin or china clay.

The varieties of paper made are chiefly the following four classes: (1) news and printing papers; (2) writing papers of various kinds, blue, cream and yellow laid, and wove and tinted, and for account books, etc.; (3) wrapping or packing papers, brown and purple, heavy manila for cartridges and bags; (4) miscellaneous, such as light copying, tissue, and pottery papers, blotting and filtering, cigarette, etc. Lastly, there are all kinds of cardboards and millboards made. The principal kinds of papers embrace 2,000 names of various kinds and qualities. In 1772 there were 60 varieties of paper made from as many different materials, and 10 or 12 years later the number had been extended to 103. In those days all paper was manufactured by hand, each sheet separately. The rags were pulped in mortars by trip-hammers, and several days were required to turn out a sample of dry finished paper. The workman dipped a rectangular sieve or mould into the vat and deposited the sheet of fluid pulp on a piece of felt to dry.

This simple mode of manufacture, which is still largely practiced in Holland and Italy, has been superseded very generally by continuous machines, and only a small quantity of paper for special books, editions de luxe, etc., besides a superior writing, bank-note, and drawing paper is now made by hand. The various machines for making paper in continuous lengths are wonderful productions of mechanical skill. These machines consist of contrivances for causing an equal supply of pulp to flow on an endless wire-gauze apron, which revolves and carries on the paper till it is received on an endless sheet of felt, passing around and between large couching cylinders. At the Pittsburgh Exhibition there was a roll 14 miles long, 18 inches wide, and weighing 2,658

pounds. Some of the machines are 75 to 100 feet long and 120 inches wide, requiring a building to themselves, and making a sheet of paper 7 feet in width. In the United States, for fine book-work, the paper receives a white coating after it has been made; the finish thus given to the surface renders possible the illustrations seen in our best magazines. The productive power of a modern paper-making machine is very great; it moves at a rate of from 20 to 200 feet per minute, spreading pulp, couching, drying and calendering as it goes, so that the stream of pulp flowing in at one end is in two minutes passed out as finished paper at the other.

Paper Production of the World.—In the United States great progress has been made in paper manufacture. The first mill was established in 1690 on ground now included within Philadelphia. In 1770 there were 40 paper mills in Pennsylvania, New Jersey, and Delaware, and only three or four in New England. In Great Britain and Europe there are over 3,000 mills; Canada has, in recent years become a chief producer of pulp for paper. In 1918 the product in that country was valued at $119,309,434. In 1919 nearly 150,000 tons were exported.

The United States leads all nations in paper production, between 9 and 10 million tons annually. In 1909 newsprint paper was included in the free tariff list. Much of the wood pulp was obtained from Canada until the war when shortage of help made it necessary to obtain the material from Scandinavia. The blockade cut off this supply and paper prices in the United States rose to prohibitive figures. In 1919 and 1920 the United States Government warned great users of paper that they must reduce their demands on the market supply.

The production of newsprint paper in 1919 was over 1,000,000 tons.

PAPHLAGONIA, in ancient geography, a country of Asia Minor, bounded on the N. by the Euxine; on the S. by Galatia; on the E. by the Halys, which separates it from Pontus, and on the W. by the river Parthenius, which parts it from the Bithynia. Paphlagonia contained seven principal cities, of which Sinope (the capital), Gangra, Amastris, and Sora, were the most important. It is mentioned by Homer, 962 B. C.; was incorporated in the Lydian empire by Crœsus, 560–546 B. C.; and in that of Persia by Cyrus, 546 B. C. It was united to Pontus by Mithridates III., 290 B. C.; formed a part of the province of Galatia, under the Romans, 25 B. C.; and was made a separate province by Constantine I. (323–337).

PAPHOS, in ancient geography, the name of two towns in the Isle of Cyprus. The older city, Palaipaphos (now Kuklos, or Kouklia), was situated in the W. part of the island, about 1¼ miles from the coast. It was probably founded by the Phœnicians, and was famous for a temple of Venus, who was said to have here risen from the sea close by, whence Aphrodite, "foam-sprung," and who was designated the Paphian goddess. The other Paphos, called Neopaphos (now Baffa), was on the sea coast, about 7 or 8 miles N. W. of the older city, and the place in which the apostle Paul proclaimed the Gospel before the proconsul Sergius, and struck the sorcerer Elymas blind.

PAPIER-MACHÉ, a material composed principally of paper. The commoner varieties are prepared by pulping any kind or mixture of different kinds of paper into a homogeneous mass of a doughy consistence. Some earthy material may be mixed with the pulp, as well as chemicals, resinous substances, and glue to harden it and prevent the attacks of insects. The pulp is rolled into thick sheets, and a sufficient quantity is taken to form the article of ornament desired; this is subjected to heavy pressure between cameo and intaglio dies and afterward dried. Its surface may now be gilded, painted with oil or size colors, or varnished. The toughness and lightness of this material peculiarly adapt it for table ware, table and desk furniture, interior architectural and other ornaments.

PAPILIO, a butterfly; in entomology, the typical genus of the family *Papilionidæ*. It has long antennæ and very short palpi. About 500 species are known, many of them from Africa and the Eastern Archipelago.

PAPUA. See NEW GUINEA.

PAPYRUS, in botany, a genus of *Cypereæ*, having the inflorescence in spikelets, with many flowers, surrounded by long bracts; the seeds three cornered. *P. antiquorum*, sometimes called *Cyperus papyrus*, is the plant from which the ancients made paper. It has an underground stem, at intervals sending up ordinary stems 8 or 10 feet high. It grows on the banks of the Nile, the Jordan and in the S. of Italy. The paper was made from thin slices of the stem cut vertically. It was made also into boats and its fibers used for cordage. *P. corym-*

bosus, or Pangorei, is manufactured into Indian mats; also in literature, rolls of papyrus with writings on them constituting an ancient book.

PARÁ, a state of Brazil, in the N. E., bounded by the Guianas, Maranhão, Goyaz, Matto Grosso, Amazonas, and the Atlantic. The estuary of the Amazon, also called Para, covers a large part of the state, which rises by series of plateaus to an elevation of 26,000 feet. The thick forests are rich in rubber, and cereals and tobacco are raised in the plains. Cocoa, nuts, leather, and rubber are the principal exports. The area totals 443,789 square miles, and is rich in undeveloped minerals. Capital, Pará. Pop. about 660,000.

PARÁ (official name Belém), a thriving city and seaport of Brazil, capital of the state of the same name, on the E. bank of the Pará river, 70 miles from its mouth, on a point of land formed by the entrance of the Guandú. The harbor is nearly landlocked by wooded islands, and admits vessels of large size. Tram cars and telephones are in general use, and there is a railway to Braggança (108 miles). The principal buildings are the theater, the government building, custom house, and cathedral (1720). The city contains a small fort and botanic gardens. The place is not unhealthy, though the wet season extends over nearly two-thirds of the year. Pará is the emporium of the Amazon river trade, supplying the towns of the interior with foreign goods, and exporting india-rubber, cacao, Brazil nuts, the *piraucú* fish, etc. The annual value of the exports exceeds. Pop. about 285,000.

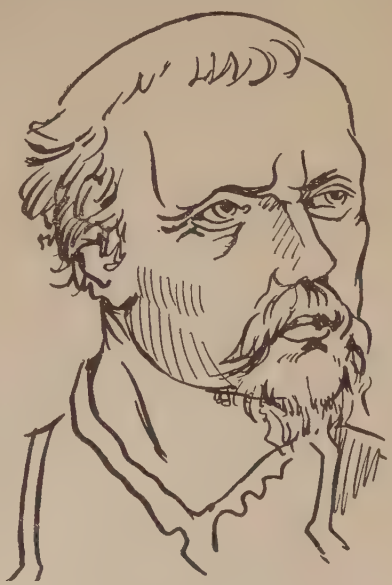
PARÁ, the name which the Tocantins river receives in its lower course, from Cameta downward (138 miles). It is 20 miles broad opposite the city of Pará, and 40 miles broad at its mouth. The Paranan, an arm of the Amazon, which cuts off Marajó Island from the mainland, pours into it part of the waters of the great river.

PARABLE, a comparison, a similitude; specifically a fable or allegorical relation or representation of something real in life or nature, from which a moral is drawn for instruction. An allegorical or mystical saying or expression; a proverb.

PARABOLA, in conic sections, a plane curve of such a form that if from any point in the curve one straight line be drawn to a given fixed point, the other perpendicular to a straight line given in position, these two straight lines will always be equal to one another.

PARABOLOID, in geometry, a volume bounded by a surface of the second order, such that sections made by planes passed in certain directions are common parabolas. It is a characteristic property of paraboloids that they have no centers except in the extreme cases, when they have an infinite number of centers. There are three varieties of paraboloids, elliptical, hyperbolic, and parabolic.

PARACELSUS, a German theosophist, physician, and chemist; born in Einsiedeln, near Zurich, Switzerland, in 1493. His real name was Philip Theophrastus Bombastus von Hohenheim, but he assumed the high-sounding name of



PARACELSUS

Aureolus Theophrastus Paracelsus. He learned the rudiments of alchemy, astrology, and medicine from his father, and then became a wandering scholar, visiting almost all parts of Europe. He made some fortunate cures, and announced that he had discovered an elixir which would prolong life indefinitely; whereby he made himself, for a time, an immense reputation of physic and surgery in the University of Basle. But his arrogance, language, drunkenness and debauchery, soon destroyed his fame and influence, and he lost his professorship, and left Basle in 1527. The rest of his life was spent in roving, practicing medicine, indulging in low habits,

and writing his books, which were published in 10 volumes. Notwithstanding all his faults, errors, and absurdities, Paracelsus gave a new direction to medical science, by his doctrine that the true use of chemistry is not to make gold, but to prepare medicines; and from his day the study of chemistry became a necessary part of medical education. He died in Salzburg in 1541.

PARACHUTE, a device by which a descent is made from a balloon or an eminence. It is a light structure, and affords a large area of resistance to the atmosphere. It is usually in shape like an umbrella, 20 to 25 feet in diameter. It remains closed like an umbrella while the balloon to which it is attached is ascending, opening as soon as the descent begins, the expanded top serving to moderate its velocity.

It was sometimes used by aviators during the World War (1914-1918) to escape from damaged aeroplanes. Every observation balloon used in the war was equipped with parachutes.

PARACLETE, the being who, both in the authorized and revised versions of the New Testament, is called the "Comforter," alternative renderings being given in the margin of the latter. Advocate, Helper, or Paraclete. He is "the Spirit of Truth" (John xv: 26, xvi: 13), the Holy Ghost (xiv: 26). His function with regard to the world is to convict it in respect of sin, of righteousness, and of judgment (xvi: 8–11) (Revised Version). Montanus in the 2d century, Manes in the 3d, and Mohammed in the 7th century, each claimed to be the promised Paraclete, whom none of the three, however, identified with the Holy Ghost.

PARADISE FISH, a popular name for *Macropus viridiauratus* (lacépède), from the East Indian Archipelago. Its coloration is brilliant and it is frequently found in aquaria.

PARADISEIDÆ, birds of paradise; a family of passerine birds. The family differs from the *Corvidæ*, to which it is closely allied, in the outer being shorter than the middle, and longer than the inner toe, the hind toe being very large and equaling the middle in length. In his monograph on the family, D. G. Elliot divides it into three sub-families: *Paradiseinæ*, *Epimachinæ*, and *Tectonarchinæ*.

PARADOX, a tenet or statement contrary to received opinion; an assertion which is contrary to appearance, and seemingly absurd, impossible, or at variance with common sense, but which may, on examination, be found to be perfectly correct and well founded.

PARADOXES, COUNTRY OF. Holland, where the ocean is higher than land.

PARAFFIN, or PARAFFINE, a solid, fatty substance, produced along with other substances in the dry or destructive distillations of various organic matters, such as coal, bituminous shale, lignite, peat, etc., at a low red heat. It is found along with liquid oils in petroleum, and in the native state in coal and bituminous strata, known as fossil, wax, ozokerite, etc. Paraffin is a mixture of several hydrocarbons, probably homologues of marsh gas of high atomic weight. Many of the paraffins are found ready formed in petroleum and other mineral oils. In mining, a name adopted for a group of native hydrocarbons, having the general composition: Carbon, 85.71; hydrogen, 14.29 = 100. It embraces the species urpethite, hatchettite, ozocerite, zietrisikite, and elaterite.

PARAGUAY, a republic of South America; bounded on the N. and N. E. by Brazil, on the S., S. E., and S. W. by the Argentine Republic, and on the N. W. by Bolivia; area, about 98,000 square miles; pop. (1905) 631,347; (1920) about 1,000,000.

Topography.—A mountain chain called Sierra Amamboy, running in the general direction of N. to S., and bifurcating the E. and W. toward the S. extremity, under the name of Sierra Maracayu, divides the tributaries of the Paraná from those of the Paraguay, none of which are very considerable, though they are liable to frequent and destructive overflows. The N. portion of Paraguay is in general covered by low, gently swelling ridges, separated by large grass plains, dotted with palms. There are mountains in the N. E. and N. W. corners. The S. portion is one of the most fertile districts of South America, consisting of hills and gentle slopes richly wooded, of wide savannas, which afford excellent pasture ground, and of rich alluvial plains, some of them marshy, or with shallow pools of water, but a large proportion are of extraordinary fertility and highly cultivated.

Climate.—The climate is temperate, reaching as high as 100° in summer, but in winter being generally 45°.

Production.—The meat packing and curing industry has been greatly developed in recent years, and hides, jerked beef, and other animal products are exported in considerable quantities. Yerba maté, or Paraguay tea, a natural product of the forests, is one of the chief

articles of export. There were sent abroad in 1918 3,628,436 kilos of yerba. Tobacco is one of the principal products, and about 220,000 cwts. are exported annually. Paraguay also produces quebracho extract to the amount of about 25,000 tons annually. The area devoted to sugar, which is used largely for the manufacture of spirits, is about 12,000 acres and the sugar production is about 1,700 tons annually. Agriculture is for the most part primitive, but the cultivation of cotton has been encouraged, but is not yet developed. Iron, manganese, copper, and other minerals occur in various parts of the country.

Commerce.—The total imports in 1918 amounted to £1,030,345, and the exports to £1,234,264. The chief imports are textiles, provisions, hardware, wines, and spirits. The chief exports are hides, yerba, oranges, tobacco, timber, canned and preserved beef, and quebracho extract.

Transportation.—There is a railway from Asunción to Encarnación, a distance of 232 miles. There are also several other lines and roads. There is a national telegraph line with about 2,050 miles of wire. There are three wireless telegraph stations. In 1918, 3,705 vessels entered the port of Asunción, and 3,708 cleared.

Education.—Education is free and nominally compulsory. There were in 1918 1,086 primary schools, with 65,612 pupils and 1,607 teachers. There are several private schools, including commercial schools. There are 7 National Colleges with an attendance of about 1,500. There is also a university which has about 250 students.

Finances.—The revenue and expenditures amount to about £1,000,000 annually. The external debt in January 1, 1919, amounted to about 37,000,000 paper dollars.

Government.—On Nov. 25, 1870, a new constitution was proclaimed. There is a Congress composed of a Senate and a House of Deputies. The members of both houses are elected by popular vote at the ratio of one senator for every 12,000 inhabitants, and one representative for every 6,000 inhabitants. The executive authority is vested in a president, whose term of office is four years. There are five departments in the president's cabinet, viz., Interior, Finance, Justice and Worship, War and Foreign Affairs. By the law of 1919 there are 20 senators and 40 deputies.

History.—The history of Paraguay is highly interesting. It was discovered by Sebastian Cabot in 1526, but the first colony was settled in 1535 by Pedro de Mendoza, who founded the city of Asunción and established Paraguay as a province of the vice-royalty of Peru. In the latter half of the 16th century the Jesuit missionaries were sent to the aid of the first preachers of Christianity in Paraguay; but for a long time they were almost entirely unsuccessful, the effect of their preaching being in a great degree marred by the profligate and cruel conduct of the Spanish adventurers, who formed the staple of the early colonial population. In the 17th century the home government consented to place in their hands the entire administration, civil as well as religious, of the province; and, in order to guard the natives against the evil influences of the bad example of European Christians, gave to the Jesuits the right to exclude all other Europeans from the colony. From this time forward the progress of civilization as well as of Christianity was rapid. In 1811 Paraguay declared itself independent of Spain, and from that time to the present has existed as a republic ruled by dictators or presidents, some of whom have really been great despots. The central department, in which the capital, Asunción, is situated, contains nearly one-third of the whole inhabitants; and the capital itself, 45,000. The inhabitants of the towns consist chiefly of whites, or of half-breeds, speaking Spanish. The native population of the provinces are chiefly Guaranis, speaking the Guarani language. In 1865-1870 Paraguay was at war with the combined forces of Brazil, the Argentine Confederation, and Uraguay, and as a result of that struggle lost much territory.

The significant feature of the history of the country during recent years has been the development of agriculture and railways. There have been slight political disturbances. There was a civil war in 1911 and 1912, but in the latter year Eduardo Sherer became president and began an epoch of peace. Many reforms were made by administration of the laws and measures were taken to secure the prosperity of the people. There was a revolt against his rule in 1915 but it was repressed. In the same year the government signed a treaty with Bolivia providing for the settlement of boundary disputes. Paraguay remained neutral in the World War until Germany proclaimed its submarine blockade. It then severed diplomatic relations. The Assembly on Nov. 13, 1919, approved the League of Nations. Dr. Manuel Gondra was inaugurated president on Aug. 15, 1920.

PARAGUAY, a large river of South America, an affluent of the Paraná, rises in the Brazilian province of Matto Grosso, 9,535 feet above sea-level. Pursuing a S. W. course, and after flowing through a level country covered with thick forests, the Paraguay is joined from the W. by the Jauru, in lat. 16° 30′ S. It then continues to flow S. through the marsh of Xarayes, which, during the season when the stream rises, is an expansive waste of waters, extending from N. to S. over about 200 miles. The river still pursues a circuitous but generally S. course, forming the boundary line between Brazil and Bolivia, thence flowing S. S. W. through the territories of Paraguay to its junction with the Paraná, a few miles above the town of Corrientes. Its chief affluents are the Cuyaba, Tacoary, Mondego, and Apa on the left; and the Jauru, Pilcomayo, and Vermejo on the right. The entire length of the river is estimated at 1,800 miles; it is on an average about half a mile in width, and is navigable for steamers to the mouth of the Cuyaba, 100 miles above the town of Corumba.

PARAHYBA, capital of the Brazilian state of Parahyba, on the river of the same name, 10 miles from the sea. Its chief buildings are the cathedral and the government palace (formerly the Jesuit college.) A large sugar mill was erected in 1889. At the mouth of the river is a bar; but a railway (12 miles) was built in 1889 to the port of Cabedello, there terminating in a pier in deep water. The annual exports are sugar, cotton, and cottonseed, chiefly to Great Britain. Pop. (1917) 32,000. The state, the easternmost in the republic, has an area of 28,854 square miles, pop. (1917) 682,350. A more important Parahyba river farther south, enters the Atlantic, in the state of Rio de Janeiro, after a course of nearly 500 miles. It is navigable for 50 miles from its mouth.

PARALDEHYDE, $C_6H_{12}O_3$, a polymer of acetaldehyde. A water-white liquid, with a peculiar, but not unpleasant odor, and a burning, but subsequently cooling taste. Specific gravity 0.995, melting point 12.6° C. boiling point 124° C. Prepared from acetaldehyde by the action of hydrochloric acid, sulphur dioxide or zinc chloride. Paraldehyde is a hypnotic, and differs from choral in its greater speed of action and in that it has no depressant effect on the heart. Its administration sometimes causes an outbreak on the skin, and in large doses it may cause digestive trouble. It is also used in the manufacture of dyes.

PARALLAX, the difference of direction of a body as seen from two different points. It is generally applied to the direction of the heavenly bodies as seen from the earth's center and from some point of its surface. The parallax is greater the nearer the body and the greater the distance between the points in a direction at right angles to that of the body. The term is also applied to the difference in direction of a body seen from different points of the earth's orbit, the longest diameter of which is insufficient in case of some fixed stars.

PARALLEL LINES, two straight lines are parallel to each other when they lie in the same direction. Any number of straight lines are parallel to each other when they have the same direction, or when they are respectively parallel to a given straight line.

PARALLELOPIPED, or **PARALLELOPIPEDON**, in geometry, a regular solid bounded by six plane surfaces, or parallelograms, the opposite pairs of which are similar, parallel, and equal to each other. If the parallelograms are squares, the solid is a cube.

PARALLELS, in astronomy and geography small circles of the celestial sphere or of the surface of the earth which are parallel to the equator, having a common pole with the latter. On the earth's surface they are generally called parallels of latitude, and in the sky parallels of declination.

PARALYSIS, the loss of the natural power of sensation or motion in any part of the body. It is owing to some diseased condition of the nervous system, either of the brain or spinal cord, or of the nerves. If the nerves of sensation or their centers be affected, there will be loss of sensation; if of motion, then loss of motion; to the latter of which the term paralysis is by some exclusively applied. The most usual form is when one side or half of the body is deprived of sensation or motion, or both, called hemiplegia; paraplegia is when the lower part of the body is paralyzed, while the upper retains both sensation and motion; and general paralysis is when the loss of nervous power extends over nearly every part of the body. In hemiplegia, the seat of the disease is one side of the brain, usually that opposite to the affected side of the body; in paraplegia, the lesion is within the spinal cord; and when more limited in extent, the disease usually arises from some abnormal state of a particular nerve. Paralysis frequently follows

apoplectic attacks, and this usually in its most severe and dangerous form. The prognosis must be looked on as extremely unfavorable when the attack is sudden, the paralysis extensive and complete, and the loss of consciousness protracted; while, on the other hand, when the paralysis advances gradually, there is more reason to hope for prolonged life, if not for a complete restoration of health.

Among the other causes that may give rise to paralysis are various injuries and diseases of the brain or spinal cord; as tumors, inflammation, external injuries, etc. When paralysis takes place without any previous apoplectic attack, the premonitory symptoms are a general torpor or lassitude, occasional giddiness, or a sense of weight and pain in the head, and loss of memory. When it is the result of injury of the spinal cord, then, of course, the paralysis takes place instantly. Paraplegia sometimes lasts for many years without greatly interfering with any function except locomotion; but when it occurs during fevers and advances rapidly, it is of very sinister augury, especially if it involves the sphincter muscles of the anus and bladder. Paralysis is not a disease of itself, but only a sign of some disorder of the nervous system, probably at a distance from parts affected.

PARAMARIBO, the capital of Dutch Guiana, on the Surinam, about 10 miles from its mouth. It has broad, tree-shaded streets, with clean wooden houses, painted light gray, and numerous canals and churches. There are also a governor's palace, two forts, a park, etc. The Herrnhuters (Moravian Brethren) are a strong body in the town. Except for the small harbor of Nickerie, all the trade of the colony is at Paramaribo. Pop. (1918) 37,051.

PARANÁ, a city of Argentina, the capital of the province of Entre Rios. It is on the Paraná river, 370 feet from its mouth. The town is well built and has a number of handsome public buildings, including a normal school and handsome college. It has an important trade and steamship connection with Santa Fé. Pop. about 40,000. From 1853 to 1861 Paraná was the capital of Argentina.

PARANÁ, a state of Brazil, in S. E. bounded by Atlantic Ocean, São Paulo, Paraguay, Matto Grosso, Argentina, and Santa Catharina. Rises from sea-level to a plateau on which elevations further rise to 5,000 feet above the sea. There are dense forests, but on the plains cocoa, coffee, maté, and rice are cultivated. Tributaries of the Paraná river irrigate the state. Area 67,570 square miles. Capital, Curitiba. Pop. 480,400.

PARANÁ, a river in South America, the largest except the Amazon, and draining a larger basin than any other river in the New World except the Amazon and the Mississippi. It is formed by the junction of two streams, the Rio Grande and the Paranahyba, which meet in Brazil, and it discharges itself into the estuary of the La Plata, its course latterly being through the Argentine Republic. Its principal tributaries are the Paraguay and the Salado, both from the right. Its length, from its sources to its junction with the Paraguay, is probably 1,500 miles, and thence to the sea 600 miles more. In breadth, current, and volume of water, the Paraná has 10 times the magnitude of the Paraguay.

PARANOIA, a mental disease of the psychosis type, characterized by marked delusions, tending toward persecutory ideas and apt to terminate in a form of mental degeneration. The progressive psychosis may begin almost from childhood, with a systematizing of one or several hallucinations, the symptoms of which are indicated in extravagance of speech or eccentricity of conduct, and easily aroused emotions. An element is the hereditary or acquired predisposition, though physical injury may be a predisposing cause.

The paranoiac is usually a person of fixed ideas, who is not amenable to outside influences, but whose persistence in a wrong line of conduct springs from emotional conditions that will not yield to rational exposition. The patient is apt to show himself unduly sensitive and suspicious, to imagine conspiracies directed against him, and to show an indisposition to mingle with others. The effects of these ideas and impulses are shown in the patients' inability to get on in the world, a preference for solitary pursuits, and a dislike for systematic work in any field except in that which leaves them at liberty to indulge in their ideas and delusions. The personal delusion may sometimes take a social or patriotic or religious form, and may display itself in an extreme fervor for which there is no rational basis. Where the hallucinations are strongly developed the paranoiac is apt to show distinct homicidal tendencies. In such cases the only remedy is the removal of the patient to surroundings where he can do no harm, and to improve his condition by such diversions and discipline as may suit his individual case.

PARAPET, in architecture, a wall raised breast high; the upper part of a house which is above the springing of a roof and guards the gutter; the upper part of a well, a bridge, a terrace, or balcony, etc. Parapets around the flat roofs of houses in the East are of very ancient date. Also a breast-high defense of earth or stone around a work for shielding troops from the enemy's fire. It is so formed that the earth of the excavation is sufficient for the ramparts and parapets. Inside is the body of the place; outside are the ditch, glacis, etc.

PARAPHRASE, a free translation or rendering of a passage; a restatement of a passage, sentence, or work, in which the sense of the original is retained, but expressed in other words, and generally more fully, for the purpose of clearer and fuller explanation; a setting forth in ampler and clearer terms of the signification of a text, passage, or word. In Scotland it is applied specially to 67 versifications of Scripture passages used with psalms and hymns in divine worship.

PARASANG, a Persian measure of length, varying in different places from 30 to 60 stadia. According to Herodotus it was 30 stadia, *i. e.*, about 3¾ English miles. Used to denote a long distance, as we say a mile.

PARASITE, in botany, the parasites on plants are either animals or vegetables. Some of the latter are of high organization, as loranthus and orobanche among exogens, and epiphytal orchids among endogens. Many cryptogams in certain ferns, mosses, lichens, and fungals are parasites. The roots of the more highly organized parasites penetrate the substance of the herb at whose expense they feed. The lower parasites, by means of their cells, penetrate other cells to live in and on them.

In mineralogy, a plumose variety of boracite occurring in the interior of crystals of the same, and resulting from their partial alteration.

In zoölogy, an animal which lives in, on, or at the expense of the actual substance of another. Van Beneden divided parasites into three classes: (1) Parasites proper, living at the expense of the organic substance of the hosts, as the tapeworm; (2) commensals, who live with, or on, but not at the expense of their hosts, as sea anemones often live on shells of hermit crabs, and come in for a share of their prey; and (3) mutualists, a class not clearly defined, and now generally abandoned. Leuckhart divided parasites into ecto- and endoparasites, according as they lived on or within, their hosts. Of the latter, by far the larger number belong to the type Vermes. Vertebrate parasites are rare, but exist among the Pisces. Myxine (the hagfish or borer) penetrates the abdominal cavity of gadoids, and feeds on their flesh.

PARASITIC PLANTS, those which, unable to nourish themselves, prey upon other plants or animals; becoming attached, they gain access to the tissues of their host and feed upon its juices. The mistletoe has no roots in the ground; its seed is left by a bird on an apple or an oak tree, to which, when it begins to grow, it becomes attached by means of special organs called haustoria, which act as roots and enable it to draw crude sap, water, and salts from its host, and having green leaves it can absorb carbonic acid from the air, and elaborate food for its tissues. In the case of the dodder, again, which begins life as an independent plant, the seed germinates underground; when the young plant reaches the surface it fastens upon some host, twining round it, sending its haustoria deep into the tissues, and drawing all its nourishment from them; it bears no green leaves, but only flowers, while the part in the ground dies. There are some parasites which are attached to the roots instead of the stems of their hosts—*e. g.*, yellow rattle, cow wheat, eyebright. The attachment by the haustoria is always remarkably intimate; their tissues are always joined to the corresponding ones of the host, often in such a way that it is difficult to say to which plant they belong. Allied to parasitism is symbiosis, a sort of mutually arranged parasitism for the benefit of both parties; as in the case of the lichens, which consist of algæ and fungi in partnership.

But the most important and interesting of the vegetable parasites are those belonging to the schizomycetes or bacteria, whose study has assumed such prominence. The relations of these organisms to their host are much more intimate than in the case of the larger parasites, and the problems presented by the disease associated with them are consequently much more difficult of solution; but in some cases the parasitic nature of these diseases has been completely established.

PARCÆ. See FATES.

PARCHMENT, the skin of a very young calf, sheep, or goat, dressed and prepared for writing on, etc. After re-

moving the wool, the skin is steeped in lime and stretched in a wooden frame, and its face is scraped with a half-round knife. The skin, previously sprinkled with powdered chalk or slacked lime, is then rubbed and scraped with a knife, and it is then rubbed with a lambskin having the wool on to smooth the surface and raise a very fine nap. The grain surface is then removed with a knife and the skin pumiced, if necessary, to give it an equal thickness. Extra fine, thin parchments are made from the skins of still-born lambs, kids, and calves. Coarse parchment for drumheads, etc., is made from calves', asses', and hegoats' skins.

PARDO BAZAN, EMILIA, COUNTESS OF. Spanish novelist. She was born at La Coruña, Galicia, in 1851, and after marrying José Quiroga, lived in Madrid, later journeying in several European countries. She edited a journal in Madrid, "Nuevo Teatro Crítico," and wrote essays voluminously. Her books made her a considerable figure early and she was eventually made a countess and given a responsible position in Public Instruction. Her works include: "Pascuel López"; "Un Viaje de Novios"; "Los Pazos de Ulloa"; "El Cisne de Vilamorta"; "La Madre Naturaleza"; some of them translated into English.

PARDON. The pardoning power is a prerogative of the sovereign power in a state, whether representative or monarchical. In the United States the pardoning power for offenses against the general government is vested in the President, the authority being delegated by the people through the medium of the Constitution of the country. For offenses against the States the pardoning power is vested in the several governors, or as in a few cases, the governor and State legislature conjointly. The signification of pardon is to be differentiated from that of amnesty, which latter is the obliteration of a peculiar line of offenses arising on a special occasion, and does not bar prosecution for offenses other than those specified, while pardon includes all offenses of which a person may have up to date been guilty and absolves the offender entirely.

PARDUBITZ, a town of Czecho-Slovakia, at the junction of the Chrudimka and the Elbe rivers. Prior to the World War it was in a province of Bohemia and part of the former Austro-Hungarian empire. It has a palace, several churches and public institutions. Before the war there were manufactories of spirits, sugar, agricultural implements, lumber and flour. Pop. (1910) 20,419.

PAREGORIC, the compound tincture of opium, benzoic acid, camphor, and oil of anise, every fluid ounce containing 2 grains each of opium and benzoic acid, and 1½ grains of camphor. This preparation is much used both by the profession and the public for coughs, colic, etc. It has also been found useful in chronic rheumatism, and especially in the case of children, to relieve slight pains in the stomach and bowels.

PARENT, a term of relationship applicable to those from whom we immediately receive our being. Parents, by the law of the land, as well as by the law of nature, are bound to educate, maintain, and defend their children, over whom they have a legal as well as a natural power; they likewise have interests in the profits of their children's labor, during their nonage, in case the children live with and are provided for by them; yet the parent has no interest in the real or personal estate of a child, otherwise than as his guardian.

PARENTHESIS, a sentence or part of a sentence inserted in the middle of another sentence, with the subject of which it is cognate, but from which it may be omitted without impairing the grammatical construction or the substantial meaning. It is commonly marked off by upright curved lines ( ), but frequently also by dashes — —.

PAREPA-ROSA, MADAME (EUPHROSYNE PAREPA DE BOYESKU), a British operatic singer; born in Edinburgh, May 7, 1836; made her début in Malta in 1855; first appeared in England in 1857 and in the United States in 1866. In 1867 she married Carl Rosa and they organized an opera company in which she was very successful. Her voice was a soprano of great power and compass and she was greatly admired in oratorio singing. She died in London, Jan. 21, 1874.

PARESIS, a form of paralysis, called softening of the brain, characterized by chronic progressive psychosis, affecting the nervous system in early adult life, with increasing mental degeneration, ending in death. The indication of the disorder is first shown in the moods of the patient, who becomes irritable, slovenly, and distrait. Detail loses attraction for him, and he is full of grandiose plans, new in him, and beyond his ordinary capacity. With increasing incapacity a sense of his own importance is gradually developed, and he revels in

imaginary magnificence, either anticipatory or retrospective. Meanwhile his physical condition is lowered, and he becomes increasingly unable to attend to his own wants. His irritability may lead him into unrestrained profanity of language or indecency of behavior. There are strong emotional periods. His limbs and features tremble, articulation becomes impaired, as well as the power of writing. Finally, after a period seldom extending over five years, paralysis and convulsions bring death from exhaustion, though a complication of diseases is apt to hasten the process.

The disease is much more frequent in men than in women, and is apt to first show itself in the late thirties or the forties. The almost invariable cause is now believed to be syphilis, aggravated by alcoholic or similar excess, sunstroke, and injury to the nervous system. In the early stages rest, diversion, diet and hydropathic treatment will help the patient. In the later stages constant attendance at home or in a hospital becomes imperative.

PARIA, GULF OF, an inlet of the Atlantic on the N. E. coast of South America, between the island of Trinidad and mainland of Venezuela, inclosed on the N. by the Peninsula of Paria. It possesses good anchorage, and receives some arms of the Orinoco.

PARIAH, in southern India, one of that section of the community with which even the lowest recognized castes will not eat, though there are Hindus inferior even to the pariahs. The latter are Turanian, and originally constituted that section of the aborigines of the S. of India who submitted to the Aryan and other conquerors during the successive invasions of the land. Many pariahs are servants of Europeans, hence more civilized than the castes above them; and a number of them have embraced Christianity.

PARIAN MARBLE, a white, large-grained and considerably translucent marble, called by the Greeks *lychintes*, from *lychnos* = light, because quarried by lamplight. It was the most celebrated statuary marble of antiquity, and was found in the island of Paros, also in Naxos and Tenos. The celebrated statues of the Venus de Medicis, the Venus Capitolini, etc., are made of this marble.

PARIMA, or PARIME SIERRA, a mountain range situated in the N. E. of Venezuela. In general it is composed of bare plateaus, and its highest peaks rise to a height of about 8,000 feet. The Essequibo, Orinoco, and Rio Branco have their rise in this range.

PARIS (anciently, Lutetia Parisiorum), the capital of France and of the department of the Seine. The city lies in the Seine valley surrounded by heights, those on the N. being Charonne La Villette, the Buttes-Chaumont and Montmartre, those on the S. St. Geneviève, Montrouge, and the Butte-aux-Cailles. Through the valleys between these heights the river runs from E. to W., inclosing two islands, upon which part of the city is built. It is navigable by small steamers. The quays or embankments, which extend along the Seine on both sides, being built of solid masonry, protect the city from inundation and form excellent promenades. The river, which within the city is fully 530 feet in width, is crossed by numerous bridges, the more important being Pont Neuf, Pont des Arts, Pont du Carrousel, Pont Royal, Pont de l'Alma, etc. The city is surrounded by a line of fortifications which measures 22 miles; outside of this is the enceinte, while beyond that again are the detached forts. These now form two main lines of defense. The inner line consists of 16 forts, the outer line of 18 forts, besides redoubts; the area thus inclosed measuring 430 square miles, with an encircling line of 77 miles. The climate of Paris is temperate and agreeable. The city is divided into 20 arrondissements, at the head of which is a *maire*. Each arrondissement is divided into four quarters, each of which sends a member to the municipal council. The council discuss and vote the budget of the city. At the head is the prefect of the Seine and the prefect of police. The water supply of the city is derived from the Seine and the Marne, from the Ourcq canal, from artesian wells, and from springs.

Streets, Boulevards, Etc.—The houses of Paris are almost all built of white calcareous stone, and their general height is from five to six stories, arranged in separate tenements. Many of the modern street buildings have mansard roofs, and are highly enriched in the Renaissance manner. In the older parts of the city the streets are narrow and irregular, but in the newer districts the avenues are straight, wide, and well paved. What are known as "the boulevards" include the interior, exterior, and military. That which is specifically called "The Boulevard" extends, in an irregular arc on the N. side of the Seine, from the Place de la Bastille in the E. to the Place de la Madeleine in the W. It includes the Boulevards du Temple, St. Martin, St. Denis, des Italiens, Capuchins, Made-

leine, etc., and its length of nearly 3 miles forms the most stirring part of the city. Here may be noted also the magnificent triumphal arches of Porte St. Denis and Porte St. Martin, the former of which is 72 feet in height. On the S. side of the Seine the boulevards are neither so numerous nor so extensive, the best known being the Boulevard St. Germain, which extends from Pont Sully to the Pont de la Concorde. The exterior boulevards are so named because they are outside the old city limits; and the military boulevards, still farther out, extend round the fortifications. After the boulevards mentioned the best streets are the Rue de Rivoli, Rue Castiglione, Rue de la Paix, Rue de la Chaussée d'Antin, the Rue des Pyramides, and 12 fine avenues radiating from the Place de l'Etoile. There are six passenger stations for the railways to the various parts of the country, and a railway around the city (the *ceinture*), by means of which interchange of traffic between the different lines is effected. There are also tramway lines to Versailles, St. Cloud, and other places in the suburbs, and an underground electric road.

THE PANTHEON AT PARIS

Squares, Parks, Etc.—The most notable public squares or *places* are the Place de la Concorde, one of the largest and most elegant squares in Europe, surrounded by fine buildings and adorned by an Egyptian obelisk, fountains, and statues; Place de l'Etoile, in which is situated the Arc de Triomphe, a splendid structure, 152 feet in height; the Place Vendôme, with column to Napoleon I.; Places des Victoires, with equestrian statues of Louis XIV.; Place de la Bastille, with the Column of July; Place de la République, with colossal statue of the Republic; etc. Within the city are situated the gardens of the Tuileries, which are adorned with numerous statues and fountains; the gardens of the Luxembourg, in which are fine conservatories of rare plants; the Jardin des Plantes, in which are the zoölogical gardens, hothouses, museums, laboratories, etc., which have made this scientific institution famous; the Buttes-Chaumont Gardens, in which an extensive old quarry has been turned to good account in enhancing the beauty of the situation; the Parc Monceaux; and the Champs Elysées, the latter being a favorite holiday resort of all classes. But the most extensive parks are outside the city. Of these the Bois de Boulogne, on the W., covers an area of 2,150 acres, gives an extensive

view toward St. Cloud and Mont Valérien, comprises the race courses of Longchamps and Auteuil, and in it are situated lakes, an aquarium, conservatories, etc. The Bois de Vincennes, on the E., even larger, is similarly adorned with artificial lakes and streams, and its high plateau offers a fine view over the surrounding country. The most celebrated and extensive cemetery in Paris is Père la Chaise (106½ acres), finely situated and having many important monuments. The Catacombs are ancient quarries which extend under a portion of the S. part of the city, and in them are deposited the bones removed from old cemeteries now built over.

Churches.—Of the churches of Paris the most celebrated is the cathedral of Notre Dame, situated on one of the islands of the Seine, called the Ile de la Cité. It is a vast cruciform structure, with a lofty W. front, flanked by two square towers, the walls sustained by many flying buttresses, and the E. end octagonal. The whole length of the church is 426 feet, its breadth 164 feet. The foundation of Notre Dame belongs to the 6th century; the present edifice dates from 1163; but was restored in 1845. The interior decorations are all modern. The church of La Madeleine, a modern structure in the style of a great Roman temple, entirely surrounded by massive Corinthian columns, stands on an elevated basement fronting the N. end of the Rue Royale; the church of St. Geneviève, built about the close of the 18th century, was after its completion set apart, under the title of the Panthéon, as the burying place of illustrious Frenchmen; St. Eustache (1532–1637), a strange mixture of degenerate Gothic and Renaissance architecture; St. Germain l'Auxerrois, dating from the 15th and 16th centuries; St. Gervais; St. Roch; St. Sulpice; Notre Dame de Lorette; St. Vincent de Paul; etc. On the very summit of Montmartre is the church of the Sacred Heart, a vast structure in mediæval style, estimated to cost $4,800,000. The Protestant churches are the Oratoire and Visitation, and chapels belonging to English, Scotch, and American denominations. There are also a Greek chapel and several synagogues.

Palaces and Public Buildings.—Notable among the public buildings of Paris are its palaces. The Louvre, a great series of buildings within which are two large courts, is now devoted to a museum which comprises splendid collections of sculpture, paintings, engravings, bronzes, pottery, Egyptian and Assyrian antiquities, etc. (see LOUVRE); the palace of the Tuileries, the main front of which was destroyed in 1871 by the Communists, has since been restored, with the exception of its principal façade, the ruins of which have been removed and its site converted into a garden; the Palais du Luxembourg, on the S. side of the river, has very extensive gardens attached to it, and contains the Musée du Luxembourg, appropriated to the works of modern French artists; the Palais Royal is a famed resort; the Palais de l'Elysée, situated on the Rue St. Honoré, with a large garden, is now the residence of the President of the Republic; the Palais du Corps Législatif, or Chambre des Députés, is the building in which the Chamber of Deputies meets; the Palais de l'Industrie, built for the first international exhibition in 1855, is used for the annual *salon* of modern paintings, etc. The City Hall is situated in the Place de l'Hôtel de Ville, formerly Place de Grève, on the right bank of the river. It was destroyed by the Communists in 1871, but has now been re-erected on the same site with even greater magnificence. It is a very rich example of Renaissance architecture. The Hôtel des Invalides, built in 1670, with a lofty dome, is now used as a retreat for disabled soldiers and is capable of accommodating 5,000. It contains the burial place of the first Napoleon. The Court House is an irregular mass of buildings occupying the greater part of the W. extremity of the Ile de la Cité. Opposite the Court House is the Tribunal de Commerce, a quadrangular building inclosing a large court roofed with glass. The Mint (Hôtel des Monnaies) fronts the Quai Conti, on the S. side of the Seine, and contains an immense collection of coins and medals. The other principal government buildings are the Treasury (Hôtel des Finances), in the Rue de Rivoli; the Record Office (Hôtel des Archives Nationales). The Exchange (La Bourse) was completed in 1826; it is in the form of a parallelogram, 212 feet by 126 feet, surrounded by a range of 66 columns. A distinctive feature are the extensive markets, among the most important of which are the Halles Centrales, where fish, poultry, butcher meat and garden produce are sold. A notable and unique structure is the Eiffel Tower, built in connection with the Paris Exhibition of 1889, and which is to have a permanent existence. It is a structure of iron lattice-work, 984 feet high, and having three stages or platforms. It is as yet the highest building in the world.

Education, Libraries, Etc.—The chief institution of higher education is the academy of the Sorbonne, where are the

university "faculties" (see FRANCE, section *Education*) of literature and science, while those of law and medicine are in separate buildings. There are, besides, numerous courses of lectures in science, philology, and philosophy delivered in the Collége de France, and courses of chemistry, natural history, etc., in the museum of the Jardin des Plantes. Among other Parisian schools are the secondary schools or lycées, the most important of which are Descartes (formerly Louis le Grand), St. Louis, Corneille (formerly Collége Henry IV.), Charlemagne, Fontanes (formerly Condorcet), De Vanves; the Ecole Polytechnique for military and civil engineers, etc.; Ecole des Beaux-Arts; School of Oriental Languages; Conservatoire des Arts-et-Métiers, and the Conservatoire de Musique. Of the libraries the most important is the Bibliothèque Nationale, the largest in the world. The number of printed volumes which it contains is estimated at 2,500,000, besides 3,000,000 pamphlets, manuscript volumes, historical documents, etc. The other libraries are those of the Arsenal St. Geneviève, Mazarin, De la Ville, De l'Institut, and De l'Université (the Sorbonne). There are also libraries subsidized by the municipality in all the arrondissements. Among museums, besides the Louvre and the Luxembourg, there may be noted the Musée d'Artillerie, in the Hôtel des Invalides, containing suits of ancient armor, arms, etc.; the Conservatoire des Arts et Métiers; the Trocadéro Palace, containing curiosities brought home by French travelers, casts from choice specimens of architecture, etc.; and the Cluny Museum, containing an extensive collection of the products of the art and artistic handicrafts of the Middle Ages. The chief of the learned societies is the Institute of France.

Hospitals.—There are many hospitals in Paris devoted to the gratuitous treatment of the indigent sick and injured; and also numerous establishments of a benevolent nature, such as the Hôtel de Invalides, or asylum for old soldiers, the lunatic asylum (Maison des Aliénés, Charenton), blind asylums; the deaf and dumb institute (Institution des Sourds-Muets); two hospitals at Vincennes for wounded and convalescent artisans; the *crèches*, in which infants are received for the day at a small charge; and the *ouvroirs*, in which aged people are supplied with work.

Theaters.—The theaters of Paris are exceedingly numerous. The most important are the Opera House, a gorgeous edifice of great size; the Opéra-Comique, the Théâtre Français, the Odéon; the Théâtre de la Gaîte, for vaudevilles and melodramas; Théâtre des Folies Dramatiques, Théâtre du Châtelet, Théâtre du Vaudeville, Théâtre des Variétés, Théâtre de la Porte-St.-Martin, and the Théâtre de l'Ambigu Comique.

Industries and Trade.—The most important manufactures are articles of jewelry and the precious metals, trinkets of various kinds, fine hardware, paper hangings, saddlery, and other articles of leather, cabinet work, carriages, various articles of dress, silk and woolen tissues, particularly shawls and carpets, Gobelin tapestry, lace, embroidery, artificial flowers, combs, machines, scientific instruments, types, books, engravings, refined sugar, tobacco (a government monopoly), chemical products, etc. That which is distinctively Parisian is the making of all kinds of small ornamental articles, which are called *articles de Paris*. A large trade is carried on by the Seine both above and below Paris, as well as by canals.

Population.—According to approximate estimates the population of Paris was, in 1474, 150,000; under Henry II. (1547–1559), 210,000; in 1590, 200,000; under Louis XIV. (1643–1715), 492,600; in 1856 (before the annexation of the suburbs), 1,174,346; 1861 (after the annexation), 1,667,841; 1881, 2,269,023; 1886, 2,256,050; 1896, 2,536,834; 1906, 2,763,393; 1911, 2,888,110; 1920, 3,300,000.

History.—The first appearance of Paris in history is on the occasion of Cæsar's conquest of Gaul, when the small tribe of the Parisii were found inhabiting the banks of the Seine, and occupying the island now called Ile de la Cité. It was a fortified town in A. D. 360, when the soldiers of Julian here summoned him to fill the imperial throne. In the beginning of the 5th century it suffered much from the northern hordes, and ultimately fell into the hands of the Franks, headed by Clovis, who made it his capital in 508. In 987 a new dynasty was established in the person of Hugo Capet, from whose reign downward Paris has continued to be the residence of the kings of France. In 1437 and 1438, under Charles VII., Paris was ravaged by pestilence and famine, and such was the desolation that wolves appeared in herds and prowled about the streets. Under Louis XI. a course of prosperity again commenced. In the reign of Louis XIV. the Paris walls were leveled to the ground after having stood for about 300 years, and what are now the principal boulevards were formed on their site (1670). Only the Bastille was left (till

1789), and in place of the four principal gates of the old walls, four triumphal arches were erected, two of which, the Porte St. Denis and Porte St. Martin, still stand. Many of the finest edifices of Paris were destroyed during the Revolution, but the work of embellishment was resumed by the directory, and continued by all subsequent governments. The reign of Napoleon III. is specially noteworthy in this respect; during it Paris was opened up by spacious streets and beautified to an extent surpassing all that had hitherto been effected by any of his predecessors. The most recent events in the history of Paris are the siege of the city by the Germans in the War of 1870–1871, and the subsequent siege carried on by the French national government in order to wrest the city from the hands of the Commune. Paris has been the scene of international exhibitions in 1855, 1867, 1878, 1889, and 1900. During the World War Paris was subjected to repeated air raids from German aeroplanes, and to bombardment from a great gun 70 miles distant. The aggregate loss of life and damage to property was relatively small. See WORLD WAR.

PARIS, a town and county-seat of Lamar co., Tex.; on the Texas and Pacific, Texas Midland, and other railroads; 64 miles E. of Sherman. It contains a court house, hospitals, private schools, National banks, and several daily and weekly newspapers. It has manufactories of furniture, plows, cotton-seed oil, brick, and large wholesale and shipping interests, wagons, blind and sash industry, etc. Pop. (1910) 11,269; (1920) 15,040.

PARIS, in Homeric mythology, the seducer of Helen, and the cause of the Trojan War; a younger son of Priam, King of Troy, by Hecuba, his queen. His mother, before the birth of Paris, having dreamed that she had brought forth a firebrand that would destroy both the palace and the city, consulted the oracle, and the priests advised the killing of the child as soon as born. Paris was, accordingly, intrusted to a slave, who was bound to execute the decree; and carried the child to the side of Mount Ida, where, touched with pity, the man left him; and where he was found by shepherds, taken home, and reared. As Paris grew up he showed such nobility of soul and daring, as to obtain the title of "The Defender," or Alexander. At the marriage of Peleus, King of Thessaly, and Thetis, the goddess of Discord—out of envy at being left out of the list of invited guests —secretly entered the nuptial hall and flung down a golden apple, on which was inscribed "The Prize of the Fairest." All the females claimed the apple as their own; and the angry feeling was only partially appeased by appointing an umpire, and allowing Minerva, Juno, and Venus to stand as candidates before the judge. So general had the reputation of the shepherd Paris become that he was unanimously selected for that responsible office. His decision fell to Venus. This judgment of Paris so enraged Minerva and Juno that they vowed eternal enmity against both Paris and his family. Priam, having been subsequently informed of the preservation of his son, and finding him so noble in appearance and heroic in his bearing, at once acknowledged him as his son.

Some time after his restoration his father dispatched him to Greece on some political mission, when, remembering the promise made to him by Venus, that he should possess the most beautiful woman in the world for his wife, and having heard the report of the surpassing attractions of the Spartan Helen, he steered his fleet for Lacedæmon, and visiting the court of Menelaus, King of Sparta, where he found the lovely Helen, who had become the wife of the Spartan king, far exceeded all the accounts he had received of her fascination and beauty. While the monarch was away Paris persuaded Helen to elope with him to Troy, where they were welcomed by Priam and installed in Ilium.

This violation of good faith, and the breach of hospitality committed by the Trojan, so enraged the Spartan king, that he called upon the other states of Greece to make a common cause of the indignity he had suffered, and declare a war of extermination against Troy. Every state and kingdom in Greece responded and Troy was besieged for 10 years. Paris, abashed by the injury he had inflicted on Menelaus, avoided on all occasions meeting the Spartan king in the frequent battles that ensued. Once, however, according to Homer, they met, when Paris would have fallen but for the interposition of Venus. It was a javelin, hurled by Paris, that found the vulnerable spot in Achilles, and brought that hero down. The death of Paris is variously told; he fell at or previous to the sack of Troy, Helen returned, as a prize, with her husband to Greece.

PARIS, LOUIS ALBERT PHILIPPE, D'ORLEANS, COUNT OF. See ORLÉANS.

PARIS, DECLARATION OF. In 1856 the representatives of the Powers

agreed to four points in international law—viz.: (1) Privateering is abolished; (2) the neutral flag covers enemies' goods, excepting contraband of war; (3) neutral goods, with the same exception, are not liable to be seized even under an enemy's flag; (4) blockades, in order to be binding, must be effective. The United States refused to accept the first point, because the European Powers declined to affirm that hereafter all private property should be exempted from capture by ships of war. See NEUTRALITY.

PARIS, TREATIES OF. Of the numerous treaties bearing this designation a few only of the most important can be mentioned here. On Feb. 10, 1763, a treaty of peace was signed between France, Spain, Portugal, and England in which Canada was ceded to Great Britain. On Feb. 6, 1778, was signed that between France and the United States, in which the independence of the latter country was recognized. A treaty was signed between Napoleon I. and the allies, ratified April 11, 1814, by which Napoleon was deposed and banished to Elba. The treaty for the conclusion of peace between Russia on the one hand, and France, Sardinia, Austria, Turkey, and Great Britain on the other, at the end of the Crimean War, was ratified March 30, 1856. The treaty of peace with Germany, at the end of the Franco-German War, was concluded May 10, 1871, and modified by the convention of Oct. 12, 1871, by which France lost a great part of the Rhine provinces. The treaty between Spain and the United States at the end of the American-Spanish War was concluded Dec. 10, 1898; was ratified by the United States Senate, Feb. 6, 1899; was signed by President McKinley, Feb. 10, 1899; and by the Queen Regent of Spain, March 17, 1899. The most important treaty signed at Paris was that which concluded the World War. The Peace Conference which concluded this treaty met on Jan. 18, 1919, and its deliberations were continued at the Palace of Versailles until June 28, 1919, when the instrument was signed by the German and the Allied and Associated representatives. See WORLD WAR: PEACE TREATY.

PARIS, UNIVERSITY OF, a notable French institution that came into existence in the beginning of the 13th century, and was long the most famous center of learning in Europe. It was suppressed by a decree of the Convention of 1793.

PARIS GREEN, a poisonous green powder composed of a mixture of double salts of the acetate and the arsenite of copper; used to destroy the potato bug, or Colorado beetle.

PARISH, a district marked out as that belonging to one church, and whose spiritual wants are to be under the particular charge of its own minister; or, to give the sense which the word often has in acts of Parliament, a district having its own offices for the legal care of the poor, etc.

PARK, in a legal sense, a large piece of ground inclosed and privileged for wild beasts of chase, by the monarch's grant, or by prescription. The only distinction between a chase and a park was that the latter was inclosed, where a chase was always open. The term now commonly means a considerable piece of ornamental ground connected with a gentleman's residence; or an inclosed piece of public ground devoted to recreation, and generally in or near a large town. See NATIONAL PARKS.

PARK, MUNGO, a celebrated Scotch traveler; born in Selkirkshire, Scotland, Sept. 10, 1771. He was sent to Africa under the auspices of the African Association, and explored the Gambia and Upper Niger, publishing on his return the well-known "Travels in the Interior of Africa" (1799). On his second expedition, which was equipped by the British Government, he descended the Niger some 1,500 miles; and after losing the majority of his men from fever, was treacherously murdered by natives, in 1806.

PARK, NATIONAL MILITARY. In the United States the name is given to a group of battlefields, celebrated in the Civil War, cared for by the War Department, and containing memorials commemorative of personages and events in that war. The most famous of them is the Gettysburg National Military Park, established in 1895, with an area of 24,460 acres, comprising the field on which the battle of Gettysburg was fought in 1863. Another is the Chickamauga and Chattanooga Park, in Georgia and Tennessee, established in 1890, with 6,966 acres, comprising the Missionary Ridge and Lookout Mountain, and the battle grounds of the Chickamauga and Chattanooga engagements. Shiloh National Military Park contains the field of Shiloh, where a battle was fought in 1862. Vicksburg National Military Park, in Mississippi, is commemorative both of the Confederate and Union forces, and the positions held by them in the spring of 1863. These sites were not established as national property immediately after the war, but

after the passage of a number of years had given them a reminiscent and hallowed character. An endeavor is made to preserve them in the condition they were in when the events commemorated occurred.

PARKER, ALTON BROOKS, an American jurist and publicist; born in Cortland, N. Y., in 1852. Studied at academies and schools and graduated from the Albany Law School in 1873. He was admitted to the bar and practiced in Ulster co. from 1877 to 1885. In the latter year he was appointed chairman of the State Democratic Committee. He was justice of the Supreme Court of New York in 1885 and a member of the Court of Appeals from 1889 to 1902. From 1898 to 1904 he was chief justice of this court and resigned to accept the Democratic nomination for the presidency. He took a prominent part in political affairs, serving as chairman of the Democratic State Convention in 1908. He

ALTON B. PARKER

served as chief counsel in many important cases in New York and elsewhere. He was president of the American Bar Association in 1906 and 1907.

PARKER, EDWARD MELVILLE, an American Protestant Episcopal bishop; born in Cambridge, Mass., in 1885. He was educated at St. Paul's School, Concord, N. H., and at Keble College, Oxford, England. He was ordained priest in 1881. From 1879 to 1906 he was master of St. Paul's School. He was made bishop coadjutor of New Hampshire in 1906 and became bishop in 1914.

PARKER, GILBERT, a Canadian novelist; born in Ontario, in 1862. Among his works are: "Pierre and His

SIR GILBERT PARKER

People"; "Tales of the Far North"; "An Adventurer of the North"; "A Romany of the Snows"; "A Lover's Diary" (1894); "The Trail of the Sword" (1894); "When Valmond Came to Pontiac"; "The Seats of the Mighty"; "Ladder of Swords" (1904); "The Judgment House" (1913); "World in the Crucible" (1915); "Wild Youth and Another" (1919). He served for several years in Parliament, Knight, 1902; baronet, 1915.

PARKER, HERSCHEL CLIFFORD, American mountain climber. He was born in Brooklyn, N. Y., in 1867, and graduated from the Columbia School of Mines in 1890. Some years later he explored the Canadian Alps, prospecting, surveying, and studying mineralogy and general physics. He began to teach physics in Columbia University in 1903, and at intervals explored the mountains of Alaska, ascending to the summit of Mt. McKinley, after a previous attempt

in which Frederick A. Cook accompanied him. He has written articles for scientific journals and published "A Systematic Treatise on Electrical Measurements."

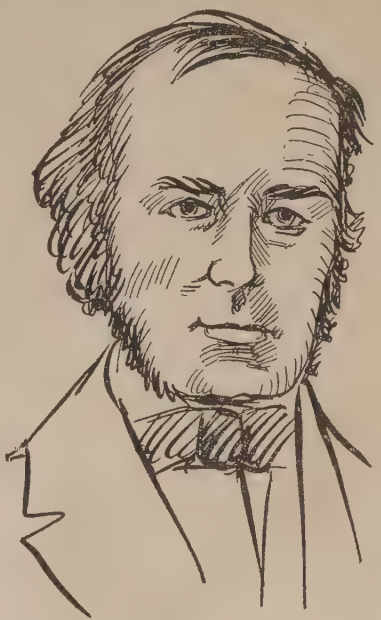
PARKER, HORATIO WILLIAM, an American composer; born at Auburndale, Mass., in 1863. He was educated in the United States and Europe and studied music at the Royal Conservatory at Munich. From 1885 to 1887 he was professor of music at the Cathedral School of St. Paul and Garden City, L. I., and was organist of Trinity Church from 1888 to 1893. From the latter year he was organist of Trinity Church in Boston. From 1894 he was professor of the theory of music at Yale University. His first opera, "Hora Novissima," was performed at Chester, England, Festival in July, 1899, and at other festivals in England. He was awarded the Metropolitan Opera prize of $10,000 for the opera "Mona," and the second prize of the same amount given by the National Federation of Women's Clubs for the opera "Fairyland," in 1914. He composed other operas and other music, sacred and secular. Died 1919.

PARKER, JOSEPH, an English preacher and orator; born April 9, 1830, in Hexham, Northumberland; was educated privately and at University College, London; elected Chairman of the Congregational Union, 1884; minister of the City Temple, London, from 1869; author of "Ecce Deus," "The Paraclete," "The People's Bible," a gigantic undertaking in 25 volumes, and "Weaver Stephens," a novel. In the autumn of 1887 Dr. Parker visited the United States, and delivered a memorial eulogy of Henry Ward Beecher in the Academy of Music, Brooklyn. He died in 1902.

PARKER, LOUIS NAPOLEON, modern English dramatist; born in 1852 at Calvados, France, and first devoted himself to the study of music in Freiburg and later at the Royal Academy in London. For nineteen years he was director of a famous English music school, the Sherborne School. Since 1896 his work has been entirely literary, and his fame rests on this and not on his musical compositions. Among his most celebrated and successful dramas are: "Pomander Walk" (1910); "Disraeli" (1911); "Drake" (1912); and "Joseph and His Brethren" (1913). Perhaps his best dramas are his two patriotic ones of "Disraeli" and "Drake," the former made famous by the actor, George Arliss.

PARKER, MATTHEW, Archbishop of Canterbury; born in Norwich in 1504; was educated at Cambridge, and after having been licensed to preach was appointed dean of Stoke College in Suffolk, a king's chaplain and a canon of Ely. In 1544 he was appointed master of Corpus Christi College, Cambridge, and elected later vice-chancellor. Queen Mary deprived Parker of his offices, and he remained in concealment till the accession of Elizabeth in 1558, by whom he was appointed Archbishop of Canterbury. While he held this office he had the Bible translated from the text of Cranmer, and published at his own expense. He founded the Antiquarian Society, and was editor of the "Chronicles of Walsingham," "Matthew Paris," and "Roger of Wendover." He died in 1575.

PARKER, THEODORE, an American theologian; born in Lexington, Mass., in 1810. He entered Harvard College in 1830, continuing, however, for a time to



THEODORE PARKER

work on his father's farm; afterward teaching school at Boston. In 1834 he entered the Theological School. He was chosen, in 1837, minister of a Unitarian congregation at West Roxbury. He had there leisure for study, and read extensively, enjoying the society of Dr. Channing. His views of Christianity had diverged considerably from the standard of his sect, and great excitement was occasioned by his sermon "On the Transient and Permanent in Christi-

anity," preached in 1841. Wearied with the bitterness and opposition of his adversaries, he visited Europe in 1843. The prejudice against him led to his quitting West Roxbury, and settling at Boston in 1846, as minister of the Twenty-eighth Congregational Society. In the following year he became joint-editor with Emerson and Cabot of the "Massachusetts Quarterly Review." He distinguished himself as the fearless opponent of the Fugitive Slave Law and sheltered slaves in his own house. He was very active as a public lecturer on various political and social topics, and was the correspondent of many eminent men. Early in 1859 he was compelled to relinquish his duties and seek health in France and Italy. His earliest published work was the "Discourse of Matters Pertaining to Religion" (1847). It has been widely read in Europe as well as in America, and is one of the most important contributions to religious philosophy. Among his other works are: "Critical and Miscellaneous Writings"; "Theism, Atheism, and the Popular Theology"; "Discourses of Politics"; "Experiences as a Minister," etc. He died in Florence in 1860.

PARKER, WILLARD, an American physician and surgeon; born in New Hampshire in 1800; Professor of surgery in the New York College of Physicians and Surgeons, 1839–1869; and subsequently Professor of Clinical Surgery in the same institution; he made many important discoveries in practical surgery. He died in 1884.

PARKERSBURG, a city and county-seat of Wood co., W. Va., on the Ohio river at the mouth of the Little Kanawha, and on the Baltimore and Ohio Southwestern, the Baltimore and Ohio, and the Little Kanawha railroads; 96 miles S. W. of Wheeling. The Ohio river is crossed here by a railroad bridge constructed in 1869–1871. It is 1⅓ miles long and has six spans. Here are waterworks, a high school, Academy of the Visitation, a seminary, United States Government building, electric light and street railroad plants, National and State banks and daily and weekly newspapers. Its manufactories include lumber mills, barrel factories, machine shops, iron foundries, veneer and panel works, furniture factories, and an oil refinery. The assessed valuation is over $6,000,000. Pop. (1910) 17,842; (1920) 20,050.

PARKHURST, CHARLES HENRY, an American clergyman and reformer; born in Framingham, Mass., April 17, 1842. He was graduated at Amherst College in 1866; studied theology in Germany. After 1880 he was pastor of the Madison Square Presbyterian Church, retiring in 1917. In 1891, as president of the Society for the Prevention of Crime, he began his attack on the police department of New York City, and was prominent in the Lexow investigation which followed. His writings include: "The Blind Man's Creed" (1883); "Three Gates on a Side" (1887); "Our Fight with Tammany" (1895); "The Sunny Side of Christianity" (1901); "A Little Lower Than the Angels" (1909).

PARKMAN, FRANCIS, an American historian; born in Boston, Mass., Sept. 16, 1823; was graduated at Harvard in 1844; studied law for two years; then traveled in Europe; and returned to explore the Rocky Mountains. The hardships he endured among the Dakota Indians seriously injured his health, yet in spite of this and defective sight Parkman worked his way to recognition as a historical writer on the period of rise and fall of the French dominion in America. He paid many visits to France to examine archives. His books are "The California and Oregon Trail" (1849); "The Conspiracy of Pontiac" (1851); "Pioneers of France in the New World" (1865); "The Book of Roses" (1866); "Jesuits in North America" (1867); "Discovery of the Great West" (1869); "The Old Régime in Canada" (1874); "Count Frontenac and New France under Louis XIV." (1877); and "Montcalm and Wolfe" (1884). He died in Boston, Mass., Nov. 8, 1893.

PARKS, LEIGHTON, clergyman. He was born in New York in 1852 and studied at the General Theological Seminary, from which he graduated in 1876. After becoming ordained he became rector of Emmanuel Church, Boston, holding that charge till 1904, when he became rector of St. Bartholomew's Church, New York. From the first he established his reputation as a preacher and in addition showed considerable literary talent. His books include: "His Star in the East"; "The Winning of the Soul and Other Sermons"; "Moral Leadership and Other Sermons."

PARKS, NATIONAL. See NATIONAL PARKS.

PARLEY, PETER. See GOODRICH, S. G.

PARLIAMENT. Blackstone says that the first use of the French word *parlement*, to signify a General Assembly of the State, was under Louis VII. of

France about the middle of the 12th century.

The British Parliament.—The legislature of Great Britain and Ireland consists of the sovereign and the Houses of Lords and Commons. It arose long prior to the union of the kingdoms as the English Parliament. The first use of the word parliament in the statutes of England is in the preamble to the Statute of Westminster, A. D. 1272. The germ of the institution existed, however, long before the name arose. Each of the kingdoms of the Saxon heptarchy, or octarchy, seems to have had its witteneagemote, or meeting of wise men, which, on the union of the several kingdoms, became united into one great assembly or council. The powers of Parliament are very great. Not merely can it destroy any ministry, it can alter, and has in fact altered, the succession to the throne. At the Reformation it transferred property enjoyed by the Church of Rome and altered the National religion, endowing Protestantism with money given for Roman Catholic purposes. Parliament is called together by the sovereign, who appoints the time and place of meeting, and opens the proceedings by the delivery of a speech, either personally or by deputy. Each house can adjourn, but neither can be prorogued except by the sovereign. Each judges of its own privileges. Members of both houses are free from arrest or imprisonment on civil actions, but their property can be seized for debt. No quorum is needed for the transaction of business in the Upper House; 40 is the quorum in the Lower.

French Parliament.—A parliament arising about 987. It met at different places. In 1190 Philip Augustus instituted the Parliament of Paris. In 1302 it was divided into three chambers. It was suppressed in 1771, revived in 1774, demanded a meeting of the States-General in 1787, and was superseded by the National Assembly Nov. 3, 1789. A French parliament still exists, but not the name.

Irish Parliament.—A parliament held in Ireland when it was an independent country. In 1295 writs for knights of the shires were issued. It met for the last time on Aug. 2, 1800, the union with Great Britain having terminated its existence.

Scotch Parliament.—A parliament held in Scotland when it was an independent country. It has been traced back to a council held at Scone under the auspices of John Balliol, in 1282. There was but a single house, consisting of lords temporal and spiritual, occasionally with burgesses. Having passed the Act of Union with England on Jan. 16, 1707, its last meeting took place on April 22, of that year.

In English Law.—An assembly of the members of the Middle and Inner Temple to consult on the affairs of the society.

PARLIAMENTARY LAW. The rules which govern deliberative assemblies. Their object is to place restrictions upon individual members so as to insure that the sense of the meeting be ascertained without needless waste of time. The officers necessary for an assembly to transact business under parliamentary law are a presiding officer called a president or speaker, and a secretary. It is the duty of such a presiding officer to call the meeting to order, to state clearly the motions made and see that due order of precedence is given to the various members. The secretary or clerk keeps the minutes of the meeting, lists of committees appointed, and copies of resolutions passed.

A resolution or motion is made by a member, and according to most authorities must be seconded before the matter is considered to be opened for discussion. The member proposing the motion has the right to speak first upon it. In case the debate is being needlessly prolonged by the opposition a motion can be made from the floor to lay the question upon the table, which postpones action upon the original motion, or the previous question can be moved which demands that the chairman put the original motion to a vote at once. In case a decision by the chair is questioned an appeal can be taken to the entire body and the ruling revised, but a two-third's vote is necessary for this.

In considering what motions to bring before the assembly the speaker can use his judgment except in matters known as privileged questions. Privileged questions include motions relating to rights and privileges of members, or to adjourn, or to fix a time for adjournment; the last-named motion taking precedence of all.

An amendment can be offered to all motions except privileged questions and if they do not strike out anything in the original motion must be declared in order even if they change the entire sense of the resolution.

PARLOW, KATHLEEN, an American violinist; born at Calgary, Canada, in 1890. She went with her parents to California at the age of five years. She first appeared on the stage in San Francisco at the age of six. In 1905 she went to London and played with the

London Symphony Orchestra. She made tours in various countries of Europe and in the United States. For several seasons she played as soloist for the Boston Symphony Orchestra.

PARMA, a province and former duchy of northern Italy; having N. Lombardy, E. Modena, S. and W. Tuscany; area, 3,766 square miles. The surface is diversified, and the soil fertile in the plains. The climate is healthy except in the low-lying districts along the rivers Po, Trebbia, and Enza. Products, maize, wheat, tobacco, hemp and fruits. Numerous cattle are also reared; and it is noted for its cheese from the milk of goats. Minerals, iron, copper, salt, etc. Manufactures, silk, linen, and cotton goods, paper, glass, gunpowder, brass, etc. Capital, Parma; pop. about 160,000. During the decline of the Roman empire, Parma became a part of the kingdom of Lombardy. It was taken by Charlemagne, and transferred to the papal see in 774. In 1543 Paul III. erected Parma and Piacenza into a duchy, which he bestowed upon the Farnese family, whose line became extinct in 1731. The treaty of Aix-la-Chapelle, in 1748, gave possession of Parma to Philip, son of Philip V. and Elizabeth Farnese. In 1815 Parma, Piacenza, and Guastala were formed into a duchy, and bestowed upon Maria Louisa, wife of Napoleon I., with reversion after death to Ferdinand Charles, Duke of Lucca, the son of Maria Louisa of Spain, and the rightful heir. A revolution occurred in 1859, on which Marie Therese de Bourbon, widow of Charles III., and regent for her infant son, left the country, and Parma was annexed to the kingdom of Italy in 1860. Pop. about 350,000.

PARMA, a fortified city, capital of the above province, 72 miles S. E. of Milan. It has a fine Gothic cathedral, and the ducal palace, which contains a library of 90,000 volumes, and a museum of antiquities. Parma has also a public library of 34,000 volumes. Manufactures, silk, cotton, and woolen goods, lace, cutlery, glass, and musical instruments. Pop. about 50,000.

PARMIGIANO, or **PARMIGIANINO**, the nickname of GIROLAMO FRANCESCO MARIA MAZZOLA, an Italian painter of the Lombard school, and the most distinguished of those who followed the style of Correggio; born in Parma, Jan. 11, 1504. He began to paint when little more than 14 years of age. In 1523 he went to Rome, and was employed by Clement VII. When that city was stormed by the imperialists under Constable Bourbon in 1527 Parmigiano sat calmly at work on his picture of "The Vision of St. Jerome" (now in the National Gallery, London), and was protected from the soldiers by their leader. After this event he went to Bologna, where he painted the altar-piece, the "Madonna and Child," and returned to Parma in 1531. Having engaged to execute a series of frescoes in the Church of St. Maria Steccata, and being paid the money in advance, he delayed the work so long that he was imprisoned. After release he fled to Casal Maggiore; territory of Cremona, where he died on Aug. 24, 1540. His best-known picture is "Cupid Shaping a Bow"; he painted portraits, too, as of Charles V., Amerigo Vespucci and himself.

PARNAHYBA, a river of Brazil, rises in the Serra Mangabeiras, about lat. 9° S., and throughout its course (650 miles) forms the boundary between the states of Maranhão and Piauhy. It enters the Atlantic by six mouths. The stream is swift, but navigable by boats for nearly 350 miles. On the E. bank, 14 miles from its mouth, is the unhealthy town of Parnahyba, with a considerable trade.

PARNASSUS, a famous mountain of Greece, government of Phocis, N. W. of Mount Helicon. It has three peaks, the highest of which reaches an elevation of 8,068 feet. On the W. side lay Delphi, the seat of the famous oracle, and the fountain of Castalia. The highest peak was dedicated to Bacchus, and was the scene of the orgies of his worship. The rest of the mountain was sacred to Apollo and the Muses; hence, poets were said "to climb Parnassus."

PARNELL, CHARLES STEWART, an Irish statesman; born at his father's estate of Avondale, Wicklow co., Ireland, in 1846, connected on his father's side with a family that originally belonged to Congleton, Cheshire, and whose members included Parnell the Poet, and Sir John Parnell, chancellor of the exchequer in Grattan's Parliament; while his mother was the daughter of Admiral Stewart of the United States navy. He was educated at Magdalen College, Cambridge; became member of Parliament for Meath in 1875; organized the "active" Home Rule Party, and developed its obstruction tactics; and in 1879 formally adopted the policy of the newly formed Land League, and was chosen president of the organization. In 1880 he was returned for the city of Cork, and was chosen as leader of the Irish party. In the session of 1881 he opposed the Crimes Act and the Land Act; was arrested, along

with other members of his party; and was lodged in Kilmainham jail, and not released till the following May. In 1883 he was the recipient of a large money testimonial (chiefly collected in America), and was active in organizing the newly formed National League. At the general election of 1885 he was re-elected for Cork, and next year he and his followers supported the Home Rule proposals introduced by Mr. Gladstone. In 1887 he and other members of his party were accused by the "Times" of complicity with the crimes and outrages committed by the extreme section of the Irish Nationalist party. A commission of three judges was appointed by the government in 1888, with the result that, in February, 1890, Mr. Parnell was acquitted of all the graver charges. He died in Brighton, England, Oct. 6, 1891.

PARNELL, THOMAS, an Irish poet; born in Dublin, Ireland, in 1679; was educated at Trinity College, and taking orders in 1705 was presented to the archdeaconry of Clogher, but resided chiefly in London. He was at first associated with Addison, Congreve, Steele, and other Whigs; but later joined the Tory wits, Swift, Pope, Gay, and Arbuthnot. He assisted Pope in his translation of Homer, and wrote the Life prefixed to it. By Swift's recommendation he obtained a prebend in the Dublin Cathedral and the valuable living of Finglass. After his death a collection of his poems was published by Pope in 1721. He died in 1717.

PAROCHIAL SCHOOLS, schools, mostly elementary, maintained by religious denominations to provide instruction in matters of religious faith as well as in secular studies. Two denominations only have provided a sufficient number of parochial schools for any considerable number of their children: the Roman Catholic and the Lutheran. Of these two denominations the former has much the larger system, and because of its extent Catholic authorities have claimed exemption from school taxes for their people, asserting that by supporting parochial schools their parishioners have more than met their share of the general educational expense. It has been estimated that it would cost the nation one hundred million dollars to accommodate the children now in the Catholic parochial schools.

Roman Catholics have always asserted that religious instruction should be inseparable from education in secular matters, so as to secure the proper type of Christian citizenship. Consequently, at plenary and provincial councils Catholics have been exhorted and commanded to send their children to the parochial schools. A system of supervision of teachers in the schools was started in 1884, and since that date the number of children in Catholic schools has steadily increased. In 1900 there were 3,812 schools, in 1910, 4,972 and according to latest available figures there were 5,286 schools with 1,360,761 pupils. These schools are under the general charge of the bishop of the diocese who appoints school boards for the parishes and general superintendents to supervise school activities. The parish priest is also a controlling influence in each local school. The subjects studied are similar to those of the public schools with the addition, however, of considerable instruction in the Catholic faith. The teachers are usually members of some of the religious orders in the church or are in training for such membership. In 1911 a teachers' college was established for the training of teachers in the Catholic schools. For the most part these schools have confined themselves to elementary work, but after 1905 a number of Catholic High Schools have been established under the direct control of the bishop of the diocese. There is also established at present a course of instruction starting in the elementary schools continuing in the high schools, and closing with a degree from the Catholic Universities in America.

The other denomination supporting parochial schools is the Lutheran. Here the schools are under the charge of the separate congregations and no attempt is made to coerce the parents to send their children to Lutheran schools. They have been patronized for the most part by Germans and Norwegians who desire their children to retain some of the traditions of their homeland. The progress of the schools has been slow, in 1913 less than one-fourth of the children of Lutheran parents attended these parochial schools. Like all else that savored of Teutonic culture these schools were severely criticized during the years 1914-1920 and the result has been a decline in the number of children attending.

PAROLE, a word of promise; a word of honor; faith plighted; specifically a promise given by a prisoner on his honor that he will not attempt to escape if allowed his liberty, or that he will return to custody on a certain day if released, or that he will not bear arms against his captors for a certain time, etc. Also a password; a word given out each day in orders by the commanding officer in

camp or garrison, by which friends and foes may be distinguished. It differs from a countersign in being given only to officers, or those who inspect and give orders to the guard, while a countersign is given to all guards.

PAROS, one of the larger islands of the Cyclades division of the Greek Archipelago; a low pyramid in shape, it has an area of 64 square miles; pop. (1918) about 10,000, of whom some 3,000 live in the capital, Parœkia. Wine, figs, and wool are exported. The quarries of the famous white Parian marble are near the summit of Mount St. Elias (ancient Marpessa), and are not yet exhausted. Archilochus and Polygnotus, the painter, were born on Paros.

PARR, CATHARINE, the 6th wife of King Henry VIII.; daughter of Sir Thomas Parr; born in 1512. Married first to one Edward Borough, possibly Lord Borough, and afterward to Lord Latimer, she on July 12, 1543, became queen of England by marriage with Henry VIII. She was distinguished for her learning and knowledge of religious subjects, her discussion of which with the king had well nigh brought her to the block. Her tact, however, saved her; for she made it appear to the king's vanity that she had only engaged him in discourse about the Reformation to derive profit from his majesty's conversation. She persuaded Henry to restore the right of succession to his daughters. After Henry's death she married (1547) Sir Thomas Seymour, and died in the following year.

PARR, SAMUEL WILSON, an American educator, born at Granville, Ill., in 1857. He graduated from the University of Illinois in 1884, afterward studying in Germany and Switzerland. In 1891 he was appointed professor of applied chemistry at the University of Illinois and was also director and consulting chemist of the Illinois State Water Survey. From 1905 he was State Geologist of Illinois. He was a member of many engineering societies and wrote much on subjects relating to chemistry.

PARR, THOMAS, better known as Old Parr, born, it is said, in 1483 in Winnington, Shropshire, England. He was buried in Westminster Abbey where a monument records his longevity. His age however, has been disputed. He died in 1635.

PARRAKEET, or **PARAKEET**, a popular name for any of the smaller long-tailed parrots. The word is in common use, but is applied without any strict scientific limitation to birds of different genera, and even of different families. Generally speaking, any old-world parrot with a moderate bill, long and more or less graduated tail, with the ends of the feathers narrowed, and high and slender tarsi, is called a parrakeet.

PARRAMATTA, a town of New South Wales; on a W. extension of Port Jackson, 14 miles W. of Sydney, with which it is connected both by steamer and railway. The streets are wide and regular. "Colonial tweeds," "Parramatta cloths" (first made at Bradford from wool exported hence). Much fruit, especially the orange, is grown here. Parramatta, formerly called Rosehill, is, after Sydney, the oldest town in the colony, having been laid out in 1790. Pop. (1917) 12,250.

PARRICIDE, one who murders his father, ancestors, or any one to whom reverence is due. The Athenians had no law against parricides, from an opinion that human atrocity could never reach to the guilt of parricide. This was also originally the case at Rome; but at a later period the delinquent, after being scourged, was placed in a leathern sack, with a dog, a cock, a viper, and an ape, and so cast into the Tiber. The English and American law treat this crime as simple murder.

PARRISH, MAXFIELD, an American decorator and painter. Born in Philadelphia in 1870 and studied at Drexel Institute and Pennsylvania Academy of Fine Arts. His work soon became widely known for its rich colored effects, which are especially good in his illustrations of the imagination of childhood. Probably his most successful work in illustrating books was achieved in the Arabian Nights. His later work has been chiefly in mural decoration and his largest single piece of work as well as his most successful is the series of seventeen panels in the Curtis Publishing Company's Building in Philadelphia.

PARRISH, RANDALL, an American writer, born in Henry co., Ill., in 1858. Studied at the University of Iowa and was admitted to the bar in that State. He later went to Arizona and New Mexico, and engaged in newspaper work in several cities in the West. He was the author of "When Wilderness Was King" (1904); "Gordon Craig" (1912); "The Red Mist" (1914); "The Devil's Own" (1917), and many other books.

PARROT, the popular name for any individual of a well-known group of birds from the warmer regions of the

globe, remarkable for the brilliant, and in some cases gaudy, coloration of their plumage, and the facility with which many of them acquire and repeat words and phrases.

PARROTS

(A) Hawk-Billed Parrot.
(B) Red and Blue Macaw.
(C) Parrakeet.

PARROTT, ROBERT PARKER, an American inventor; born in Lee, N. H., Oct. 5, 1804; was graduated at the United States Military Academy in 1824; was Professor of Natural and Experimental Philosophy at the Academy in 1824–1826, and of Mathematics in 1826–1828. Commissioned a lieutenant, he served through the Greek war, and was afterward assigned to the Ordnance Bureau at Washington. He invented the well-known Parrott gun. He died in Cold Spring, N. Y., Dec. 24, 1877.

PARRY, SIR (CHARLES) HUBERT HASTINGS, a British composer. He was born at Bournemouth, Eng., in 1848 and made attempts at music at Eton, and at Oxford, graduating as M. A. in 1874, and studying music under Bennett, Macfarren, and Dannreuther. He held musical positions at Oxford, Cambridge, and Dublin, becoming professor of composition and musical history and finally director at the Royal College of Music. He was made a knight in 1898, and a baronet in 1903. He died in 1918. His works include "Judith"; "Job"; "King Saul" (oratorios); several symphonies and much incidental music. "Glories of Our Blood and State"; "Blest Pair of Sirens"; "Ode to St. Cecilia's Day"; "The Soul's Ransom," are his chief choral works.

PARRY, SIR WILLIAM EDWARD, an English navigator; born in Bath in 1790. He entered the navy in 1803, and in 1818 accompanied Sir John Ross, as second in command, to Baffin's Bay, in an expedition for the discovery of the Northwest Passage, which was unsuccessful. But the year following, Lieutenant Parry was appointed to the command of the "Hecla" and "Griper"; and this voyage resulted in the discovery of a considerable portion of the Northwest Passage, the ships wintering at Melville's Island. Captain Parry commanded two other expeditions that failed of success. In 1827 he again commanded the "Hecla" in an attempt to reach the North Pole. The ship was left at Spitzbergen, and Parry with his boats succeeded in reaching the highest latitude attained up to that time (82° 45′), but the drift of the ice S. prevented further advance. He died in 1855.

PARRY ISLANDS, an archipelago of the Arctic Ocean, lying for the most part N. of the seventy-fifth parallel of latitude. The islands extend toward the W. from Baffin Bay. The most important are North Devon, Cornwallis, Bathhurst, Milville and Prince Patrick. The islands are not inhabited. They were first explored by Parry in 1819.

PARSEES, or GUEBRES, the name of the small remnant of the followers of the ancient Persian religion, as established or reformed by Zoroaster (Zarathustra or Zerdusht). The relation in which Zoroaster stood to the ancient Iranian faith and his date have been much debated. It has been alleged that at first the doctrine was a pure monotheism; that Zoroaster taught the existence of but one deity, the Ahura-Mazdâo (Ormuzd), the creator of all things, to whom all good things, spiritual and worldly, belong. The principle of his philosophy, was dualism: there being in Ahura-Mazdâo two primeval causes of the real and intellectual world—the Vohu Manô, the Good Mind or Reality (Gaya), and the Akem Manô, or the Naught Mind or Nonreality (Ajyâiti). Certainly, however, the pure idea of monotheism, if it ever existed, did not long prevail. The two sides of Ahura-Mazdâo's being were taken to be two distinct spirits, Ahura-Mazdâo and Angrô-Mainyush (Ahriman), who represented good and evil—God and Devil. These

each took their due places in the Parsee pantheon ere long and Parsism became a characteristic dualism.

The Zoroastrian creed flourished up to the time of Alexander the Great, throughout ancient Irania, including Upper Tibet, Sogdiana, Bachtriana, Media, Persia, etc. On the establishment of the Sassanians (A. D. 212), a native Persian dynasty, by Ardashir (Artaxerxes), the first act of the new king was the general and complete restoration of the partly lost, partly forgotten books of Zerdusht, which he effected, it is related, chiefly through the inspiration of a Magian sage, chosen out of 40,000 Magi. The sacred volumes were translated out of the original Zend into the vernacular and disseminated among the people at large, and fire temples were reared throughout the length and breadth of the land. The Magi or priests were all-powerful, and their hatred was directed principally against the Greeks. The fanaticism of the priests often also found vent against Christians and Jews. In return the Magi were cordially hated by the Jews; but later we frequently find Jewish sages on terms of friendship and confidence with some of the Sassanian kings. From the period of its re-establishment the Zoroastrian religion flourished uninterruptedly for about 400 years, till in A. D. 651, at the great battle of Nahavand (near Ecbatana), the Persian army under Yezdejird was routed by the Caliph Omar. The great mass of the population was converted to the Mohammedan faith; the small remnant fled to the wilderness of Khorasan. Some 9,000 Guebres are still found in Persia, mainly in Yezd, Kerman, and at Teheran. Others found a resting place along the W. coast of India, chiefly at Bombay, Surat, Ahmedabad, and the vicinity, where they now live under English rule, being for the most part merchants and landed proprietors. Parsee traders have also settled at Calcutta, Madras, Aden, Zanzibar, in Burma, and in China. They bear equally with their poorer brethren in Persia the highest character for honesty, industry, and peacefulness, while their benevolence, intelligence, and magnificence outvie that of most of their European fellow-subjects. In all civil matters they are subject to the laws of the country they inhabit; and its language is also theirs, except in the ritual of their religion, when Zend, the holy language, is used by the priests. They are forward to embrace the advantages of English education, and not a few have studied law in England. Conspicuous among Parsee merchant-princes was Sir Jamsetjee Jeejebhoy. In 1918 there were about 100,000 Parsees in British India, five-sixths of them in Bombay city.

Parsees do not eat anything cooked by a person of another religion; they also object to beef and pork, especially to ham. Marriages can only be contracted with persons of their own caste and creed. Polygamy, except after nine years of sterility and consequent divorce, is forbidden. Fornication and adultery are punishable with death. Their dead are not buried, but exposed on an iron grating in the Dakhma, or Tower of Silence, till the flesh has disappeared, and the bones fall through into a pit beneath.

Ahura-Mazdâo being the origin of light, his symbol is the sun, with the moon and the planets, and in default of them the fire. Temples and altars must for ever be fed with the holy fire, brought down, according to tradition, from heaven, and the sullying of whose flame is punishable with death. The priests themselves approach it only with a half mask over the face, and never touch it but with holy instruments. The fires are of five kinds. There are also five kinds of "sacrifice," which term, however, is rather to be understood in the sense of a sacred action—including the slaughtering of animals; prayer; the sacrifice of expiation, consisting either (1) in flagellation or (2) in gifts to the priests; and, lastly, the sacrifice for the souls of the dead. The purification of physical and moral impurities is effected, in the first place, by cleansing with holy water, earth, etc.; next, by prayers and the recitation of the divine word; but other self-castigations, fasting, celibacy, etc., are considered hateful to the Divinity. The ethical code may be summed up in the three words—purity of thought, of word, and of deed.

PARSLEY, *carum petroselinum* or *Petroselinum sativum*. The leaves are tripinnate, the flowers yellow. Found on walls, and in waste places, as a garden escape. There are three leading varieties of the plant, the common or plain-leaved, the curled, and the Hamburg sage or carrot-rooted parsley. The second is that more generally cultivated as a culinary vegetable; sheep feeding on it are said to be less liable than others to the rot.

PARSNIP, *peucedanum sativum*, or *pastinaca sativa*. Leaves pinnate, leaflets sessile, ovate, inciso-serrate, flowers bright yellow. The boiled root is eaten as a vegetable; sheep and oxen fatten rapidly upon it; a kind of wine may be made from it; its seeds are aromatic and contain an essential oil.

PARSONS, a city of Kansas, in Labette co. It is on the Missouri, Kansas, and Texas and the St. Louis and San Francisco railroads. Its industries include flour and feed mills, grain elevators, chicken-feed factories, clothing factories, etc. It has the State hospital for epileptics, a high school, a public library, a Federal building, Masonic Temple, etc. Pop. (1910) 12,463; (1920) 16,028.

PARSONS, FRANK ALVAH, an American lecturer on art subjects, born at Chesterfield, Mass., in 1868. He was educated at Wesleyan Seminary and afterward studied art in Italy, France, England and Austria. He graduated from the department of Fine Arts at Columbia, in 1905. He was lecturer on art in Columbia and other colleges and was president and director of the New York School of Fine and Applied Arts, from 1905 to 1914. He also lectured on interior decoration for women's clubs and other bodies. He carried on yearly a course of lectures at the Metropolitan Museum of Art and conducted summer study classes in Europe yearly. He wrote several books on interior decoration and other subjects relating to art.

PARSONS, HERBERT, an American lawyer and politician, born in New York in 1869. He graduated from Yale in 1890 and afterward studied at several law schools. He was admitted to the bar in 1895. After serving as alderman in New York City he was elected a member of Congress, serving from 1905 until 1911. For many years he was chairman of the Republican County Committee and was also a member of the Republican National Committee, and was a member of the Seventh Regiment and for a time served as major and as judge-advocate on the staff of the 1st Brigade of the New York National Guard. In 1917 he was commissioned major in the Aviation Service. He was one of the most prominent Republican supporters of Gov. J. M. Cox for president in 1920.

PARSONS, FATHER ROBERT, the chief of the English Jesuits in their golden age; born in Somersetshire, England, in 1546. When 18 he passed from the free school at Taunton to St. Mary's Hall, Oxford, and after two years to Balliol College, where he took his degrees of bachelor and master, and became a fellow and tutor. Here he twice took the oath abjuring the papal supremacy, but he never received orders in the English Church. His enemies in college brought charges against him which led to his forced retirement from Oxford in 1574. He shortly afterward became a Roman Catholic and set out on foot to Rome, and offered himself to the Society of Jesus. He was ordained priest in 1578. When in the following year Dr. (afterward Cardinal) Allen, superior of the Douay seminary, succeeded in persuading the Jesuits to join with the seminary priests in the work of the English mission, Parsons and Campion were selected. Parsons in 1580 landed at Dover, disguised as a merchant of jewels. He employed six printers on a secret press, and for 12 months baffled all the attempts of the government to catch him. But after the apprehension of his companion, Campion, in July, 1581, Parsons escaped to the Continent, where he schemed for the subjection of England to the Pope by force of arms. He conspired in France with the Duke de Guise, the Provincial of the French Jesuits, the Papal Nuncio and others for an invasion of England. Now began his intimacy and influence with the Spanish king, and the series of political enterprises which culminated in the Armada of 1588. At Rouen in 1582 he had finished his book, the "Christian Directory," which has found favor with Protestant divines; and, with the aid of the Duke of Guise, he founded at Eu a seminary for youth. After the failure of the Armada he organized seminaries or clerical establishemnts for his countrymen at Valladolid in 1589, St. Lucar in 1591, Seville and Lisbon in 1592, and at St. Omer in 1593. Parsons, who went from Madrid to Rome to again assume the rectorship of the English college, now persuaded the Pope to appoint George Blackwell, a partisan of the Jesuits, an archpriest over the secular clergy, with the view of keeping the chief direction of affairs in his own hands. The appointment was resisted by the leaders of the seculars. Parsons, upon whom the odium of the appointment chiefly fell, was accused of deceiving the Pope, of tyranny over the clergy, and of continued treason against his country. An appeal carried to Rome by four delegates of the secular clergy led to a diminution of the Jesuits' power.

His industry and power of work were extraordinary. His domineering spirit and political partisanship created for him bitter enemies, while his mode of prosecuting his ends justly exposed him to charges of double dealing, equivocation, and reckless slander of his opponents. Among the best known of his voluminous publications is "The Conference on the next Succession to the Crown," written with the assistance of Allen and Sir Francis Englefield in favor of the infanta of Spain. He here insists on the right of the people to set

aside, on religious grounds, the natural heir to the throne; and advocates principles which afterward obtained for him the title of the first English Whig. Parliament made it treason to possess a copy of the book, which was reprinted in the interests of Cromwell in 1648. It was again reprinted in 1681, and publicly burned at Oxford in 1683. Another curious work by Parsons, was his "Memorial for the Reformation," in which he lays down rules for the guidance of the government, in the expected event of England's subjection to the Pope. His "Apology" for the government of the archpriest (1601) is historically interesting, while his "Manifestation of the Great Folly and Bad Spirit of Certain in England Calling Themselves Secular Priests," a passionate attack upon the conduct and morals of his clerical brethren, exhibits him on his weakest side. He died in Rome, as rector of the English college, April 15, 1610.

PARSONS, THEOPHILUS, an American jurist; born in Essex co., Mass., Feb. 24, 1750; was graduated at Harvard College in 1769, and studied law at Falmouth (now Portland), in Maine, where he was admitted to the bar in 1774. He was a member of the convention which, in 1779, framed the State constitution of Massachusetts and of the convention called to ratify the Constitution of the United States in 1789. In 1800 he removed to Boston. He was appointed in 1806 chief justice of Massachusetts. As a lawyer, "he had," according to Justice Story, "no equal in Massachusetts"; and he probably had few, if any, superiors in the United States. A collection of his judicial opinions was published; "Commentaries on the Law of the United States." He died in 1813.

PARSONS, THOMAS WILLIAM, a poet and translator of Dante. He was born in Boston in 1819, and from 1836 lived in Italy, where, after some years' study of the language of the country he produced his "Dante's Inferno," later adding parts of the Purgatorio and Paradiso. He afterward practiced dentistry in Boston and London, and died in 1892. His other works include: "Ghetto di Roma"; "The Magnolia and Other Poems"; "The Old House at Sudbury"; "The Shadow of the Obelisk, and Other Poems."

PARSONS, WILLIAM BARCLAY, civil engineer, of New York City; born in 1859, and educated at Columbia University, New York. In 1885 he became consulting engineer of New York City, a position he has held to the present time. From 1894 to 1905 he was the chief engineer for the Rapid Transit Co. of New York and constructed their great subway system. In 1898 he conducted exploration and drew up plans for a proposed railway from Hankow to Canton, China. During the war with Germany Colonel Parsons largely directed the engineering work of the New York regiments who were with the American Expeditionary Forces in France.

PARTHENOGENESIS, in biology, a term introduced by Professor Owen, who calls it also metagenesis. It signifies generation by means of an unimpregnated insect, which, moreover, is immature, not having yet passed beyond the larval state. Example, the genus *Aphis*. The winged aphides deposit eggs which produce imperfect wingless offspring, apparently mere larvæ. These larvæ, however, in some abnormal way, reproduce their species. By the time the process has gone on for 9 or 10 generations, the season is about closing, and the last brood of the larval aphides produce fully formed and winged specimens of the species, depositing eggs which are hatched in the following spring.

PARTHENON, a celebrated temple at Athens, consecrated to Athena or Minerva, the protectress of the city. The Parthenon was built on an elevated rock near the Acropolis, and has always been regarded as the most perfect example of Grecian architecture; it was built in the Doric style. The Parthenon was erected about 448 B. C., in the time of Pericles, Phidias being the chief sculptor. It had a length of 228 feet, by a breadth of 100. The principal object of art was a statue of Minerva, 26 cubits high, made of ivory and gold, in an erect position, with a lance in her hand, a shield at her feet, and Medusa's head on her chest—a work regarded as the masterpiece of Phidias. It had resisted the ravages of time down to the 17th century, till at the siege of Athens by the Venetians, in 1687, a shell fell on the roof of the Acropolis or citadel, which, firing the magazine beneath, shattered that building and the Parthenon. Early in the 19th century, it was mutilated by Lord Elgin, who removed to England its noblest sculpture.

PARTHIA, a celebrated country of ancient Asia, called by the Greeks Parthyœa and Parthyene, which was bounded N. by Hyrcania, S. by Carmania Deserta, E. by Asia, and W. by Media. Parthia was a wild and mountainous country of great extent, having 25 large cities. When Parthia became a power-

ful state, the empire of Parthia was made up of conquered kingdoms, extending from the Caucasus in the N. to the Erythræan Sea in the S., and from the Indus in the E. to the Tigris in the W. The Parthians, originally an offshoot from the Scythians, were noted for their love of war and martial glory; they were the most celebrated horsemen in the world, and excellent marksmen with the bow and arrow. The Parthians became subject to Persia; and their country, with Sogdiana and some other states, was formed into a province called a satrapy. When Alexander conquered Persia, he united Parthia and Hyrcania into one satrapy. After the dissolution of the Greek empire, the country became subject to Eumenes; next, to Antigones

PARTHENON

and the Seleucidæ—the Syrian kings—till 256 B. C. when the Parthians established their independence under Arsaces I., from whom all their succeeding monarchs received the name of Arsacidæ. Under this dynasty, the empire extended from the Indus to the Euphrates, and from the Oxus in the N. to the Persian Gulf in the S. This empire lasted for about 480 years, when the last king, Artabanus, was murdered by Artaxerxes, who, usurping the throne, founded the new Persian empire, called the Sassanidæ.

PARTICIPLE, a part of speech, so called because it partakes of the nature both of a verb and an adjective. A participle differs from an adjective in that it implies the relation of time, and therefore is applied to a specific act, while the adjective denotes only an attribute as a quality or characteristic without regard to time.

PARTINICO, a town of Sicily in the province of Palermo, about 14 miles S. W. of the city of that name. It is in a corn and fruit producing region and there are also important industries, including the manufacture of wine, linen and woolen goods. Pop. about 25,000.

PARTNERSHIP, the state or condition of being a partner, associate, or participator with another; joint interest. An association of two or more persons for the carrying on of any commercial, manufacturing, or other business undertaking, occupation, or calling; or a voluntary, verbal or written contract between two or more persons to joint together their money, labor, goods, skill, etc., or all or any of them, for the prosecution of any business or undertaking upon the understanding that the profits or losses shall be divided between them in proportion to the amount of capital, stock, labor, etc., supplied by each partner.

PARTON, JAMES, an American writer; born in Canterbury, England, Feb. 9, 1822. He wrote many valuable biographies, as: "Life of Horace Greeley" (1885); "Life and Times of Aaron Burr" (1857); "Life and Times of Benjamin Franklin" (1864); "Famous Americans of Recent Times" (1870); "Life of Thomas Jefferson" (1874); "Life of Voltaire" (1881). Among his other works are: "Humorous Poetry of the English Language" (1857); "Caricature in all Times and Lands" (1875). He died in Newburyport, Mass., Oct. 17, 1891.

PARTRIDGE, the genus *Perdix*, and especially *P. cinerea*, the common or gray partridge, a well-known game bird widely distributed in Europe. General tone of plumage brown; neck and upper part of the breast, sides, and flanks bluish gray, freckled with dark gray,

lower breast with a rich chestnut horse-shoe-shaped patch on a ground of white; sides and flanks barred with chestnut; thighs grayish white; legs and toes bluish white, claws brown. Length of adult male about 12 inches. It feeds on slugs, caterpillars, and grubs to a large extent, and so compensates the farmer for the injury it does. In the United States, any one of the several species belonging to the genus *Colinus*, including the bobwhite and other quail-like birds. Also a large bombard formerly used in sieges and defensive works.

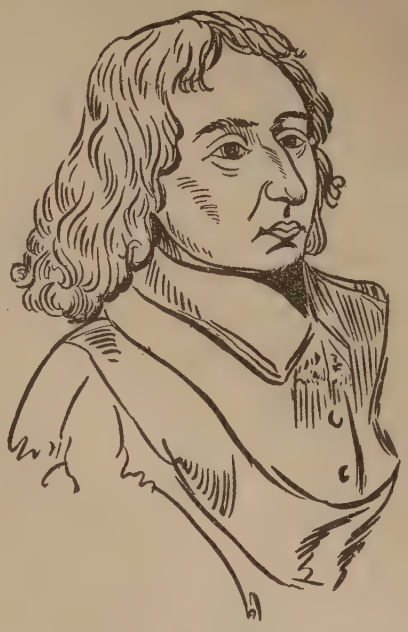
PARTRIDGE, WILLIAM ORDWAY, an American sculptor and writer on art; born in France, in 1861. Among his most notable works are: "Christ and St. John" (Brooklyn Museum of Fine Arts); "Hamilton" (Columbia University); "Shakespeare" and "Edward Everett Hale" (Chicago), and the Kaufmann and other memorial publications—"Art for America" (1894); "The Technique of the Sculptor" (1895), etc.

PARTRIDGE WOOD, believed to be derived from various West Indian and South American trees, specially *Andira inermis*. It is beautifully variegated, and was formerly used in Brazil for ship-building. In dockyards it is called cabbage wood.

PASADENA, a city in Los Angeles co., Cal.; on the Southern Pacific, Atchison, Topeka and Santa Fé and Salt Lake railroads; 9 miles N. E. of Los Angeles. It is a famous health resort, built at the foot of the Sierra Madrè Mountains in a region of equable climate and such superb scenery that it has been named the "Italy of America." There being no marsh lands, malarial fevers and like ailments are entirely unknown. The soil of the region is very fertile and almost every kind of fruit belonging to temperate and semi-tropical climes is grown in great profusion. Pasadena contains the Throop Polytechnic Institute, high school, kindergartens, a public library, a number of churches, banks, and many hotels. There are large packing industries, canneries, flour mills, and other manufactories. The city was settled by a colony from Indianapolis in 1874, since which time it has greatly developed in horticultural enterprises. Pop. (1910) 30,291; (1920) 45,334.

PASCAGOULA, a navigable river in the S. E. part of Mississippi, and formed by the junction of the Leaf and Chickasawha. It flows 85 miles S. to a small bay of the same name on the Gulf of Mexico.

PASCAL, BLAISE, a French author; born in Clermont, Auvergne, France, in 1623. His family was one of considerable distinction, his grandfather having been a treasurer of France at Riom, and his father president of the Court of Aids, in Auvergne. From his earliest childhood he exhibited precocious proofs of genius, especially in mathematics. At 12 years of age he was surprised by his father in the act of demonstrating, on



BLAISE PASCAL

the pavement by means of a rude diagram traced with a piece of coal, a proposition which corresponded to the 32d of the first book of Euclid. At the age of 16 he composed a small treatise on conic sections, which excited the admiration of Descartes. At 19 he invented his celebrated arithmetical machine, and at 26 he had composed the greater part of his mathematical works, and made those brilliant experiments in hydrostatics and pneumatics, which have ranked him among the first natural philosophers of his age. But a strong religious impulse having been imparted to his mind at this period, he thenceforward devoted himself to theology and polemics, and to the promotion of the spiritual and temporal welfare of his fellow men. He retired to Port Royal in 1654, where he spent the remainder of his days. The two works by which he is best known are his "Provincial Letters"; a caustic satire upon

the Jesuits (1656), under the name Louis de Montalte, and posthumous "Pensées," regarded as among the richest repositories of eloquent thought and profound theology. He died in 1662.

PASCHAL I., Pope, was a Roman and succeeded Stephen V. in 817. He crowned Lothaire, the emperor at Rome. He died in 824.

PASCHAL II., Pope; a native of Tuscany, succeeded Urban II. in 1099. He had a contest with the Emperor Henry IV., and also with Henry I., King of England, respecting the right of investitures. The former visited Rome, to be crowned by the Pope, who refused to perform the ceremony unless he yielded the matter in dispute. Henry caused Paschal to be seized by his troops. The Romans rose in behalf of their pontiff, and Henry retired from Rome, but carried the Pope with him. Paschal, after a captivity of two months, conceded his claim to the investitures. This concession was afterward canceled. He died in 1118.

PASCHAL III., became Pope in opposition to Alexander III. in 1164, through the influence of the Emperor Frederick I. He remained in possession of the papal chair while Alexander was absent at Benevento. He died in 1168.

PASCO, or CERRO DE PASCO (JUNIN), a town of Peru, capital of the province of its own name, department of Junin, about 130 miles N. E. of Lima. It is situated 11,000 feet above sea-level. Its former importance was due to the rich silver mines in the vicinity. Pop. about 400,000.

PAS-DE-CALAIS, a department in the N. of France, formed out of Artois and Picardy, and bounded on the W. by the Strait of Dover and the English Channel; area, 255 square miles. The surface is level, with the exception of a low ridge running to the N. W., and ending in Cape Gris-nez. The soil is fertile, mostly under cultivation, and watered by numerous short rivers, the majority of which are navigable and connected by canals. The coast line is 80 miles in length. Fishing is actively carried on, particularly in the neighborhood of Boulogne. Coal, iron, and other minerals are mined and worked. The industrial establishments are iron foundries, beet root sugar factories, glass works, potteries, tanneries, and others. Boulogne and Calais are the principal harbors. The capital is Arras. Pop. (1911) 26,000. In the first week of October, 1914, the Germans attempted to take Arras by storm, but were repulsed by the French. The attack was renewed on Oct. 20, when the town was bombarded. This continued for six days. The Germans attacked on Oct. 24, but the French lines held fast. On Oct. 26 General Maud'huy made a drive against the enemy, who was forced back so far that Arras was soon beyond the range of the howitzers. The Germans' effort was to break the Allied line, which would have enabled them to reach the Channel ports and open up the northern road to Paris.

PASEWALK, a town of Prussia, 26 miles W. N. W. of Stettin, has varied industries. It was plundered and burned three times by the Imperialists in the Thirty Years' War, by the Poles in 1657, and by the Russians in 1713. Pop. about 12,000.

PASHA, or PASHAW, a Turkish title of honor bestowed originally on princes of the blood, but now also on governors of provinces, military officers of high rank, etc. Pashas are of three grades, distinguished by the number of horsetails which they are entitled to bear on a lance as a distinctive badge. Pashas of the highest rank bear three horsetails; governors of the more important provinces, two; and minor governors, one.

PASICH, NICOLA, Serbian statesman; born in Saitehar, 1846; educated in Belgrade, and studied at the University of Engineering in Zurich, Switzerland. Fought with his countrymen against the Turks in 1876–1878, then entered politics, becoming leader of the Radical party in the Popular Assembly. Being suspected of plotting against King Milan, he was exiled abroad in 1883, but was pardoned in 1889, when he returned to Belgrade. Re-entering politics, he was elected Mayor of Belgrade. In 1891 he was called upon to form a Cabinet, and for a year was Premier. In 1893–1894 he was Serbian ambassador to Russia. In 1899 he again became implicated in a conspiracy against the throne, for which he was sentenced to death, but Russian influence brought him a speedy pardon. The ascent to the throne of the present king, Peter I., in 1903, brought him into favor again, and he became Minister of Foreign Affairs (1904–1905) and Premier in 1906–1908, and in 1912–1913. In 1914 he was again Premier, and was chiefly responsible for the diplomatic negotiations which resulted in the great war. With the king, he remained in the field with the troops, until Serbia was invaded, when he found refuge in Corfu, under English and

French protection, until the victorious reentry of the Serbian army into Belgrade, after the final defeat of the Central Powers in 1918.

PASIG, a city of the Philippines, the capital of the province of Rizal in Luzon. The city suffered from the insurrection of 1897 when a large part of the city was burned. Its chief industry is the manufacturing of pottery. Pop. about 12,000.

PASIPHAE, the wife of Minos, and mother of the Minotaur.

PASQUE FLOWER, or **PASCHAL FLOWER**, *Anemone pulsatilla*. it has a tuberous root and is common in borders. It is a very handsome plant, with purple, externally silky flowers.

PASSAIC, a city in Passaic co., N. J.; on the Passaic river, and on the New York, Susquehanna and Western, the Lackawanna and the Erie railroads; 12 miles N. W. of New York. It contains waterworks, electric street railroads connecting with Hoboken, Paterson and Newark, electric lights, Emergency Hospital, public library, National and State banks, and daily and weekly newspapers. It has extensive print works, woolen mills, silk mills, bleachery, shoddy mills, whip factory, manufactory of blankets, tanneries, etc. Pop. (1910) 54,773; (1920) 63,834.

PASSAMAQUODDY BAY, in North America, opens out of the Bay of Fundy, at the mouth of the St. Croix river, between Maine and New Brunswick. It is 15 miles long by 10 wide, and shut in by a cluster of islands so as to form an excellent harbor.

PASSAROWITZ, or **POSHAREWATZ**, a town of Serbia, 9 miles S. of the Danube and 40 S. E. of Belgrade. Here was signed, July 21, 1718, the treaty between Venice and the emperor, on the one side, and the Porte on the other, by which a truce of 25 years was established, and the Banat of Temesvar, the W. portion of Wallachia and Serbia, Belgrade, and part of Bosnia were secured to Austria. Pop. 4,000. It was occupied by the Germans in 1915.

PASSAU, a town of Bavaria, on a rocky tongue of land, on the right bank of the Danube, beside the influx of the Inn, and opposite the confluence of the Ilz with the Danube, close to the frontier of Austria. The cathedral was rebuilt after a fire in 1680; the bishop's palace is now in part converted into public offices. The Passau Agreement between the Roman Catholic and Protestant estates of the empire was signed here on July 29, and Aug. 15, 1552. Passau was long an important fortified post, being the key of the Danube in that part of its course. There were two strong citadels, one dating from 737, the other from 1215–1219. The town grew up around an old Roman camp, and in 739 was made the seat of a bishopric founded by St. Boniface. The town came into the hands of Bavaria in 1803. It has important manufactures of leather, porcelain, and parquet floors, besides boats, metal ware, and mirrors, and considerable trade in salt, timber, corn, and Passau tiles. Pop. about 12,000.

PASSCHENDAELE, a small village in northern Belgium, near Ypres, around which centered some of the most important military operations on the western front, during the World War. The village gives its name to a ridge, on whose slopes it stands, which was of great strategic value and the object of severe fighting, especially during the fall of 1917.

Beginning on Oct. 4, 1917, Field Marshal Haig, in command of the British forces based on Ypres, delivered a strong attack on the German lines, east of the city. The ground covered by the British assault was from the N. of Langemarck, on the Ypres-Staden railway, to a point S. of Tower Hamlets, a height S. of the Ypres-Menin high road.

On the north wing the British pushed on to within a short distance of Poelcappelle, and gained a footing on Gravenstafel Ridge, projecting from Passchendæle Ridge on the W., along which the Germans had constructed a very elaborate system of works. This advance into the enemy country had been preceded by a heavy artillery fire, which forestalled an attack which had been in preparation by the Germans that morning. Three whole German divisions were here advancing against the British, when they were caught in the barrage, and almost annihilated.

By the dashing advance which followed, the British were able to penetrate the German lines to a depth of 2,500 yards. To the S. the British were thus able to overlook parts of the main Passchendaele Ridge, and in places they had descended into the valley beyond. For several days the fighting raged furiously back and forth, the Germans defending their positions with a keen sense of their importance. The French troops, advancing on the left of the British line, N. of Ypres, penetrated the German lines to a depth of over a mile, along a front of nearly two miles. From the S. the Brit-

ish pushed N. E. from Grafenstafel Ridge, to a point about a thousand yards S. W. of the village of Passchendaele, up to the main heights.

It was a notable success on the part of the Allies, in that it gave the British command of the surrounding region and established a foothold in Belgium. In this important advance the Allied troops gained possession of most of the observation points that commanded a view of the great plain of Flanders.

PASSER, in ornithology, a genus of *Fringillidæ*, which in many classifications has been allowed to lapse. According to Brisson, the generic characters are: Bill hard, strong, sub-conical, bulging above and below; nostrils basal, lateral, rounded, almost hidden by projecting and recurved frontal plumes. Gape straight. First primary small and attenuated, but distinctly developed; third or fourth rather the longest. Tail moderate, nearly square. Tarsus stout, nearly as long as the middle toe. Claws moderately curved, rather short. Professor Newton makes the house sparrow *P. domesticus* and the tree sparrow *P. montanus*.

In the plural, *Passeriformes*, *Insessores*, an order of Aves, now generally placed first, and including the great mass of the smaller birds—crows, finches, flycatchers, creepers, etc.

PASSION FLOWER, the genus *Passiflora*. The three stigmas seemed to the devout Roman Catholics of South America to represent nails; one transfixing each hand, and one the feet of the crucified Saviour; the five anthers, His five wounds; the rays of the corona, His crown of thorns, or the halo of glory around His head; the digitate leaves, the hands of those who scourged Him; the tendrils, the scourge itself; while, finally, the 10 parts of the perianth were the 10 apostles—that is, the 12, wanting Judas who betrayed, and Peter who denied, his Lord.

PASSIONISTS, a congregation of Roman Catholic priests founded by Paul Francis (1694–1775) surnamed Paul of the Cross, in 1737. The first convent was established on the Celian Hill at Rome. It has been revived since 1830, and new houses have been founded in England, Ireland, Belgium, and Australia. They were introduced in 1852 in the United States, where they now possess ten monasteries. The special objects of the institute was to instil into men's minds by preaching, by example, a sense of the mercy and love of God as manifested in the passion of Christ. Hence the cross appears everywhere as their emblem. A large crucifix, moreover, forms part of their very striking costume. They go bare-footed, and practice many other personal austerities, and their ministerial work consists chiefly in holding what are called "missions," wherever they are invited by the local clergy, in which sermons on the passion of Christ, on sin, and on repentance, together with the hearing of confessions, hold the principal places.

PASSION PLAY, a mystery or miracle play founded on the passion of our Lord; a dramatic representation of the scenes of the passion. The only Passion play of importance still maintained is that periodically represented at Oberammergau in Bavaria. The

PASSION FLOWER

World War (1914-1918) was the cause for postponing the usual representation. Passion plays were introduced into America by the Spaniards, and at this day (1920) are still given in certain Mexican towns.

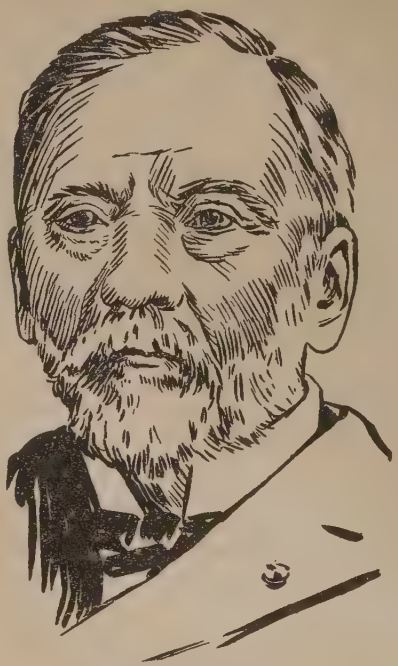
PASSOVER, a festival instituted to commemorate Jehovah's "passing over" the Israelite houses while "passing through" those of the Egyptians, to destroy in the latter all the first-born (Exod. xii: 11, 12, 23, 27). The first passover (that in Egypt), those subsequently occurring in Old Testament times, and those of the New Testament and later Judaism, were all somewhat different. In the first of these a lamb

without blemish was taken on the 10th, and killed on the 14th, of the month Abib, thenceforward in consequence to be reckoned the first month of the ecclesiastical year. The blood of the lamb was to be sprinkled on the two side posts and the single upper door post, and the flesh eaten "with unleavened bread and bitter herbs" before the morning (Exodus xii: 1–13). That night Jehovah, passing over the bloodstained doors, slew the first born in the Egyptian houses not similarly protected; and, as the emancipated Jews that night departed from Egypt, that first passover could have continued only one day. But the festival was to be an annual one. Connected with it was to be a feast of unleavened bread (Exod. xii: 14–20; Num. xxviii: 16).

Sometimes the term passover is limited to the festival of the 14th of Abib; sometimes it includes that and the feast of unleavened bread also, the two being viewed as parts of one whole (Ezek. xlv: 21). When the Jews reached Canaan, every male was required to present himself before God thrice a year, viz., at the passover, or feast of unleavened bread, at that of "harvest," and that of "ingathering" (Exod. xxiii: 16). In the Old Testament six passovers are mentioned as having been actually kept. In modern Judaism no lamb is sacrificed, but the shank bone of a shoulder of that animal is eaten, leaven put away, and other ceremonies observed.

PASSPORT, a warrant of protection and authority to travel, granted to persons moving from place to place, by a competent authority. In some states no foreigner is allowed to travel without a passport from his government. In Russia and Turkey, in particular, a passport is indispensable. Passports to British subjects are granted at the Foreign Office, London. In the United States passports, with description of the applicant, are issued by the State Department at Washington. They are issued only to citizens, native born and naturalized.

PASTEUR, LOUIS, a French chemist and physicist; born in Dôle, Jura, in 1822; educated at Jena University and the Ecole Normale, Paris, where in 1847 he took his degree as doctor. The following year he was appointed Professor of Physics in Strassburg, where he devoted much research to the subject of fermentation; in 1857 he received the appointment of dean in the Faculty of Sciences, Lille; in 1863 he became Professor of Geology, Chemistry, and Physics at the Ecole des Beaux-Arts, Paris; and in 1867 Professor of Chemistry at the Sorbonne. He became a member of the French Academy in 1882. He has been especially successful in proving the part played by microbes in fermentation and decomposition, in introducing a successful treatment of disease in silkworms and cattle, and has achieved great success in his efforts to check hydrophobia by means of inoculation. To enable him to deal with this disease under the best conditions a Pasteur Institute was opened in Paris, where patients are received from all parts of



LOUIS PASTEUR

Europe. A similar institution, in New York City, has proved very successful. He died in Paris, Sept. 28, 1895.

PASTO, a town in the S. W. of Colombia, in a fertile valley 8,350 feet above sea-level. Above it rises the volcano of Pasto (14,000 feet above the sea); and in 1827 the town was destroyed by an earthquake. Pop. about 20,000.

PASTON LETTERS, THE, a collection of letters written by and to members of the Paston family in Norfolk during the period of the Wars of the Roses. These letters deal freely with the domestic affairs, and all the relations of English popular life in the period in which they were written. An accurate

and extended edition in three volumes, by Mr. Gairdner was published (1872–1875). A four-volume edition by the same author was published (1900–1901).

PASTOR, a shepherd; now used almost exclusively in its figurative sense, for one who feeds the Christian flock; a minister of the Gospel, having charge of a church and congregation. In ornithology, the rose-colored ousel. Head, wings, and tail blue black, the feathers on the head forming a crest; back, scapulars, and rump, rose-colored. It has a wide geographical range and in habits resembles the starling. It is often called the locust bird.

PASTORAL POETRY, poetry which deals, in a more or less direct form, with rustic life. It has generally flourished in highly corrupted artificial states of society. Thus Theocritus, the first pastoral poet, made artistic protest against the licentiousness of Syracuse; and Vergil wrote his "Bucolics" and "Eclogues" in the corrupt Roman court. In the 16th century pastoral poetry received notable expression in "Arcadia" of G. Sannazaro, the "Aminta" of Tasso, and the "Pastor Fido" of Guarini; and in England, in the "Shepherd's Calendar" of Spenser, the "Arcadia" of Sidney, the "Faithful Shepherdess" of Fletcher, "As You Like It" of Shakespeare and the "Comus" of Milton. The "Gentle Shepherd" of Allan Ramsay (1725) was the last successful dramatic pastoral.

PATAGONIA, the name applied to that extreme portion of South America which is bounded E. by the Atlantic, W. by the Pacific, S. by the Strait of Magellan, and N. by the Rio Negro. Since 1881 this large territory has been, by treaty, divided between Chile and the Argentine Republic, so that the portion W. of the Andes (63,000 square miles) belongs now to the former (called Magallones), and the part E. of the Andes (360,000) belong to the latter (Rio Negro, Chubut, Santa Cruz districts). The Straits of Magellan form a S. boundary of 360 miles, and separate the mainland from the numerous islands of Tierra del Fuego. Here the Chilean Government established the settlement of Punta Arenas, with stations along the coast. Patagonia E. of the Andes consists mainly of vast, undulating plains, frequently covered with shingle and broken up by ridges of volcanic rock. The vegetation is scanty, except adjoining the Andes, and there are shallow salt lakes and lagoons. The chief rivers are the Rio Negro, the Chupat, the Rio Desire, and the Rio Chico, which have their sources in the Andes. The Patagonians are a tall, muscular race averaging fully six feet in height, with black hair, thick lips, and skin of a dark brown color. They are a nomad race, divided into numerous tribes, whose chief occupation is in hunting and cattle breeding. The country was first discovered by Magellan in 1520.

PATAN, a walled town of India, in the Nepal province; 64 miles N. W. from Ahmadabad, stands on a tributary of the Banas. It manufactures swords, spears, pottery and silk and cotton goods. Standing on the site of the ancient Anhilwara, and the capital of native dynasties from the 8th century to the present day, Patan is surrounded with lofty walls, and has numerous architectural ruins. Pop. (1918) 30,000.

PATAPSCO RIVER, a stream in Maryland which flows into Chesapeake Bay, about 14 miles S. of the city of Baltimore. It is nearly 80 miles long. The part of it below Baltimore is an estuary 3 miles wide, and navigable for large ships.

PATELLA, the same as knee cap. See KNEE. In zöology and palæontology, rock limpet; the typical genus of the family *Patellidæ*. The shell is oval, with a subcentral apex, the animal with a continuous series of branchial lamellæ, sessile eyes, and six lingual teeth. Recent species 144, from the shores of Great Britain, Norway, and other countries, living between high and low water marks. Fossil about 100 from the Silurian onward.

PATEN, a plate used from early Christian times to receive the Host consecrated at Mass. At first the paten was made of glass, but the use of this material was forbidden in the 6th century. In England it was often made of the less precious metals, though gold or silver should properly be employed. Larger patens, called *ministeriales*, were used to hold the small Hosts for the communion of the laity. In the Roman Church the paten is consecrated by the bishop with chrism, and evidence exists that this rite was in use in the 8th century.

PATENT, an exclusive right granted by a government (in letters patent or open, whence the name) to any person or persons to manufacture and sell a chattel or article of commerce of his own invention. A patent obtained in England extends to 14 years, and several of the colonies have machinery for granting patents for a like period. In France the term is 5, 10, or 15 years at the option

of the applicant; in Prussia for 15 years; in Russia for 3, 5, or 15 years; in Spain for 5, 10, or 20 years; in Belgium for 20 years; in Holland there are no patent laws; in Austria not more than 15 years; in Hungary 15 years. In the United States the person applying for a patent may present a petition, specification, oath, and filing fee, with a drawing if the nature of the case admits of it. Sec. 4884 "Revised Statutes of the United States" reads: "Every patent shall contain a short title or description of the invention or discovery, correctly indicating its nature and design, and a grant to the patentee, his heirs, or assigns, for the term of 17 years of the exclusive right to make, use and vend the invention or discovery throughout the United States and the Territories thereof." Design patents are granted for periods of three years and six months, seven years, or 14 years, at discretion of the applicant. Patents are extended only by special congressional legislation. The filing of a caveat power to applying for a patent entitles the inventor to notice of an interfering application filed during the life of the caveat (one year), during which he may perfect his invention. The alleged inventions set forth in caveats are transferable. Special facilities are given American inventors for securing patents in foreign countries, by a provision for keeping an application in the secret archives of the patent office for six months, to enable the inventor to arrange foreign patents.

Patentable Inventions.—By the statute of 1870 it was enacted that an invention to be patentable, must possess, among other qualifications, that of newness. He who produces an old result by a new mode or process is entitled to a patent for that mode or process; but he cannot have a patent for a result merely without using some new mode or process to produce it. A man is entitled to all the benefits of the article which he has invented and patented. Another who happens to discover an additional use to which the invention may be applied does not, by that discovery and application create a patentable novelty. When there is an original principle of operation, a different result in kind, or a new combination, there exists a patentable novelty. When either the manufacture produced or the manner of producing an old one is new, there is the novelty contemplated by the patent laws. The safest guide to accuracy in making the distinction between form and principle has been adjudged to be to ascertain what is the result to be secured by the discovery. Whatever is essential to that object, independent of the mere form and proportions of the thing used for the purpose, may generally, if not universally, be considered as the principle of the invention. As a cumulative definition, it may be said that novelty consists in producing a new substance, or an old one in a new way, by new machinery, or by a new combination of the parts of an old machine, operating in a peculiar, better, cheaper or quicker method, or a new mechanical employment of principles already known. No person otherwise entitled thereto is debarred from receiving a patent for his invention or discovery by reason of its having been first patented or caused to be patented by the inventor or his legal representatives or assigns in a foreign country, unless the application for said foreign patent was filed more than seven months prior to the filing of the application in this country.

Applications.—Applications for a patent must be made in writing to the Commissioner of Patents. The applicant must also file in the Patent Office a written description of the same, and of the manner and process of making, constructing, compounding, and using it in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it appertains or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of a machine he must explain the principle thereof and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions, and particularly point out and distinctly claim the part, improvement or combination which he claims as his invention or discovery. The specification and claim must be signed by the inventor and attested by two witnesses.

When the nature of the case admits of drawings the applicant must furnish a drawing of the required size, signed by the inventor or his attorney in fact, and attested by two witnesses. In all cases which admit of representation by model, the applicant, if required by the Patent Office, shall furnish a model of convenient size to exhibit advantageously the several parts of his invention or discovery.

The applicant shall make oath that he believes himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition or improvement for which he solicits a patent; that he does not know and does not believe that the same was ever before known or used before his invention or discovery thereof, and shall state of what

country he is a citizen and where he resides. In every original application the applicant must distinctly state under oath that the invention has not been patented or described in any printed publication in any country before his invention or discovery thereof or more than two years prior to his application. If any application for patent has been filed in any foreign country by the applicant in the United States, or by his legal representatives or assigns, prior to his application in the United States, he shall state the country or countries in which such application has been filed, giving the date of such application, and shall also state that no application has been filed in any other country or countries than those mentioned; that to the best of his knowledge and belief the invention had not been in public use or on sale in the United States, for more than two years prior to his application.

On the filing of such application and the payment of the fees required by law, if, on examination, it appears that the applicant is justly entitled to a patent under the law, and that the same is sufficiently useful and important, the Commissioner will issue a patent therefor. Every patent or any interest therein shall be assignable in law by an instrument in writing; and the patentee or his assigns or legal representatives may, in like manner, grant and convey an exclusive right under his patent to the whole or any specified part of the United States.

Reissues.—A reissue is granted to the original patentee, his legal representatives or the assignees of the entire interest when, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his invention or discovery more than he had a right to claim as new, the original patent is inoperative or invalid, provided the error has arisen from inadvertence, accident, or mistake, without any fraudulent or deceptive intention. Reissue applications must be made and the specifications sworn to by the inventors if they be living.

Fees.—Fees paid in advance are as follows: On filing each original application for a patent, except in design cases, $15. On issuing each original patent, except in design cases, $20. In design cases, for three years and six months $10; for seven years $15, for 14 years $30. On every application for the reissue of a patent $30. On filing each disclaimer $10.

Following are the figures for patents granted and applied for at the Patent Office in 1920.

Granted—Patents on mechanical inventions	37,316
Granted—Reissue patents	227
Granted—Design patents	2,102
Registered—Trade-marks	6,984
Registered—Labels	622
Registered—Prints	158
Total	47,409

Number of applications filed for—	
Inventions	81,948
Designs	4,110
Reissues	322
Trade-marks	14,710
Labels	1,280
Prints	570
Total	102,940

PATER, WALTER, an English author; born in London, England, Aug. 4, 1839, and educated at King's School, Canterbury, and at Queen's College, Oxford, taking a classical second class in 1862. He was elected to an open fellowship at Brasenose; traveled in Italy, France, and Germany, and, both by his subtle critical insight and the exquisite finish of his style, earned his rank among the best prose writers of his time. His books are "Studies in the History of the Renaissance" (1873), a series of essays on art and letters, on such men as Leonardo, Botticelli, Joachim du Bellay, and others; "Marius the Epicurean: his Sensations and Ideas" (1885), an imaginary biography of a young man brought up in Roman paganism, who passes through varied spiritual experience, meets Marcus Aurelius himself, and at last, shortly before his unexpected death, makes acquaintance with the mysterious new Eastern religion; "Imaginary Portraits" (1887); "Appreciations" (1889), a volume of admirable criticism on Charles Lamb, Wordsworth, Coleridge, Rossetti, Sir Thomas Browne, Blake, and on style itself. He died July 30, 1894.

PATERNO, a town of Sicily, in the province of Catania. It is on the southern slope of Mount Etna. On an eminence overlooking the city is an ancient Norman castle and chapel. The town has a trade in mineral waters, wine, oil, and hemp. Pop. (1911) 20,923.

PATERNOSTER, the Lord's Prayer, from the first two words of the Latin version; every 10th large bead in the rosary used by the Roman Catholics in their devotions. At this they repeat the Lord's Prayer, and at the intervening

small beads an Ave Maria. Also a rosary. In architecture, a kind of ornament in the shape of beads. In angling, a name given to a line to which hooks are attached at certain intervals, and also leaden beads or shot to sink it.

PATERSON, a city and the county-seat of Passaic co., N. J.; on the Passaic river, the Morris canal, and on the Erie, the New York, Susquehanna & Western, and the Delaware, Lackawanna & Western railroads; 17 miles N. W. of New York. The city is chiefly noted for its silk industries, on account of which it is called the "Lyons of America." It is built partly on the slopes of ranges of hills which surround it and partly on a broad plain.

Business Interests.—Paterson is an important manufacturing center. Its silk mills are the largest in the United States, having an output of over $200,000,000 per annum and employing about 30,000 persons. Its other manufactures include aeroplane motors, electrical motors, locomotives, and other machinery, linen thread, twine, yarns, and shirts. The city has three National banks, one savings institution, and five trust companies. The assessed valuation of the property is $131,000,000 and the net bonded debt about $5,833,000.

Public Interests.—The city has an area of 8½ square miles; 115 miles of paved streets and a sewer system covering 120 miles. The streets are lighted by electricity and gas. The Police Department has a force of 175 men. The Fire Department is completely motorized. The annual cost of maintaining the city government is about $4,150,000. The streets are well paved and broad. Among the local attractions are the Passaic Falls, the river dropping over a 70-foot precipice at this point. The principal public buildings are the city hall, court house, postoffice and the high school.

History.—Paterson was founded in 1791 by a society formed by Alexander Hamilton. The society had a capital of $1,000,000 and Hamilton's idea in organizing it and founding the city was to encourage American manufacture and make the United States industrially as well as politically independent of Europe. The city was named in honor of William Paterson, Governor of New Jersey. In 1851 it was incorporated as a city. Pop. (1910) 125,600; (1920) 135,866.

PATERSON, ROBERT, popularly known as "Old Mortality," an English stone cutter, born near Hawick, in 1712 or 1715, served his apprenticeship as a stone mason to an elder brother near Lochmaben. He married soon after 1740, and, renting a quarry for himself, took to carrying gravestones into Galloway. From about 1758 he neglected to return to his wife and five children, and for upward of 40 years devoted himself to the task of repairing or erecting headstones to Covenanting martyrs. Paterson died in Bankend, England, Jan. 29, 1801, and was buried at Caerlaverock, where a monument was erected to him by the Messrs. Black in 1869.

PATERSON, WILLIAM, an English financier; born in Dumfriesshire, Scotland, in 1658. He went through England as a peddler, settled for a time at Bristol, subsequently resided in the Bahama Islands. Returning to London he engaged in trade with success, and in 1694 proposed and founded the Bank of England, being one of its first directors. When the Treaty of Union between England and Scotland was concluded in 1707, Paterson, one of its warmest advocates, received an indemnity (of $90,000) for the losses he had sustained. Paterson was a great financial genius, but most of his views (such as his advocacy of free trade) were far in advance of his time. He died in London in 1719.

PATHOLOGY, the branch of medical science which treats of disease. It investigates its predisposing and existing cause, its characteristic symptoms, and its progress from first to last. Human pathology occupies itself with the diseases of man, and comparative pathology, which makes comparison between the diseases of man and those of the inferior animals. Vegetable pathology treats of the diseases of plants.

PATIALA, the name of a state and city of Punjab, India. The state has an area of 3,542 square miles, with a population of about 1,500,000. Included in this is timber land and fertile region, producing grain, barley, maize and wheat. There are also industries of iron and brass ware. The city and capital has a population of about 50,000.

PATMORE, COVENTRY KEARSEY DIGHTON, an English poet; born in 1823. He published his first volume of poems in 1844, became assistant librarian at the British Museum, and associated himself with the pre-Raphaelite movement. His reputation as a poet was established by the publication of the four parts of "The Angel in the House" (1854–1863), which he revised in successive editions. Besides this he published "The Unknown Eros and other Odes," a poetical anthology called the "Children's Garland," a "Memoir of B. W. Proctor" (Barry Cornwall), and several contribu-

tions to periodicals. He died in Lymington, England, Nov. 26, 1896.

PATMOS, a rocky and barren island, of most irregular outline, in the Ægean Sea, one of the Sporades, lying to the S. of Samos, now called Patino; area, 16 square miles. It is celebrated as the place to which the apostle John was exiled; in a cave here, it is said, he saw the visions recorded in the Book of Revelations. On the top of a mountain stands the famous monastery of "John the Divine," built in 1088. The island was awarded to Greece by the Treaty of Versailles. It was occupied by the Italians in the Turko-Italian War (1912).

PATNA, called also AZIMABAD, a city of Bengal, 140 miles E. of Benares, extends 9 miles along the Ganges. Apart from the Gola or government granary (1786), Patna College, the shrine of Shah Arzani, the mosque of Sher Shah, a Roman Catholic church, and a Mohammedan college, there are no buildings of moment. Its railway communication, and its central position at the junction of three great rivers, the Son, the Gandak, and the Ganges, avenues for the traffic of the northwest provinces, render Patna of great importance as a commercial center. The chief imports are cotton goods, oil-seeds, salt, sugar, wheat, and other cereals. The exports, principally oil seeds and salt, with cotton, spices, English piece goods, cocoanuts, and tobacco. Patna, under its early name of Pataliputra, is supposed to have been founded about 600 B. C. In modern times Patna is notable as the scene of a massacre of British prisoners by Mir Kasim in 1763, which led to war and annexation by the English, and for the mutiny at Dinapur, the military station of Patna, in 1857. Pop. (1918) 140,000.

PATNA, a native state of the Central provinces, India; area, 2,399 square miles; pop. about 145,000. It has been under the management of a British political agent since 1871. Patna is the chief town; pop. about 3,000.

PATON, JAMES MORTON, an American archæologist; born in New York, in 1863. He graduated New York University in 1883, afterward taking postgraduate courses at Harvard and in other European universities. From 1887 to 1891 he was professor of Latin at Middlebury College. From 1889 to 1905 he was associate professor of Greek at Wesleyan University. In 1917 he was editor in chief of the "American Journal of Archæology," and was a member of several learned societies.

PATON, JOHN GIBSON, a Scotch missionary; born in Kirkmahoe, Dumfriesshire, Scotland, May 24, 1824. After some experience in Glasgow city mission, he offered his services for the foreign mission field in connection with the Reformed Presbyterian Church, and on his ordination he settled down toward the end of 1858 among the cannibal natives of Tanna. Here he worked amid trials and privations till 1862, when the hostility of the natives forced him to leave. For 20 years he labored on the neighboring island of Aniwa, the whole population of which became Christian. Both by voice and pen he afterward attracted public attention and sympathy toward this field of mission labor. The thrilling narrative of his experiences was first published in 1890. He died in 1907.

PATRAS, or **PATRÆ**, a fortified seaport town and the most important in the W. of Greece, climbs up a hillside and spreads out at its foot on the E. shore of the Gulf of Patras, 81 miles W. by N. of Corinth and 137 W. of N. of Athens. It is a handsome city, having been almost entirely rebuilt after the ravages of the war of liberation (1821). It is defended by a citadel, is the seat of an archbishop, and has a spacious new harbor (1880) protected by a mole. It ships great quantities of currants, chiefly to Great Britain and France. Besides currants, olive oil, wine, valonia, etc., are exported. Pop. about 45,000. Patræ is the only one of the 12 cities of Achaia which still exists as a town; but most of its relics have been swept away by earthquake (551, 1820) and siege. It was an early seat of Christianity, having an archbishop before 347.

PATRIARCH, the father and ruler of a family; one who governs his family or descendants by paternal right. The term is usually applied to Abraham, Isaac, Jacob, and his sons, or the heads of families before the flood. In Church history, the highest grade in the hierarchy of ordinary jurisdiction, the see of Rome excepted. The title came into use in the 5th century. In the 4th Constantinople and in the 5th Jerusalem occupied the position of patriarchates. These Eastern sees have long been lost to the Latin Church, which admits a Maronite, a Melchite and a Syrian Patriarch of Antioch, a Patriarch of Cilicia, of the Armenian, and a Patriarch of Babylon, of the Chaldean rite. There are also three minor patriarchs in the Western Church, the Patriarch of the Indies, the prelate of the highest rank

in the church of Spain, the Patriarch of Lisbon, and the Patriarch of Venice.

PATRICIA, a district of the Province of Ontario, Canada. It has an area of 14,400 square miles. The district was added to the Province in 1912.

PATRICIAN, a Roman senator; a person of noble birth; a nobleman; a wealthy noble. Also one who is familiar with the writings of the early fathers of the Church; one versed in patristic learning. The Roman patricians consisted of about 300 *gentes*, houses, or clans, who, descending from the first Roman senators, constituted the aristocracy of the city and territory. At first the patricians monopolized all high offices in the state, but after political contests with the plebeians, lasting for centuries, Licinius (365 B. C.) carried his rogation, by which plebeians were admitted to the consulate and to the custody of the Sibylline books.

PATRICK, MARY MILLS, educator and author. She was born at Canterbury, N. H., in 1850, and graduated from Iowa State University in 1890, immediately becoming head of the American College for Girls in Constantinople. After two years in that city she resided in different parts of Europe and took a philosophical degree at Berne. Henceforth she devoted her time to philosophical studies and wrote several books, among them: "American Translation of a Text-Book of Physiology"; "Sappho and the Island of Lesbos."

PATRICK, ST., or **PATRICIUS**, the apostle or patron saint of Ireland; said to have been born near the site of Kilpatrick, Scotland. His zeal prompted him to cross the channel for the conversion of the pagan Irish, probably between 440–460. His endeavors were crowned with great success, and he established there a number of schools and monasteries. Nennius states that his missions continued 40 years and various miracles are attributed to him, particularly the expulsion of all venomous creatures from Ireland. The order of St. Patrick, the third in rank of British orders, was instituted in 1783.

PATRIOTIC SOCIETIES, organizations fostering devotion to country by the commemoration of events in the establishment of the country's freedom, and the preservation of traditions, and the restoration of historic sites and scenes. In the United States the greater number of the societies are divided between those whose origin goes back to the Revolutionary War and those originating in the Civil War. Other societies go back to the Colonial period and these are the earliest. The Society of Mayflower Descendants, Society of the Ark and Dove, Society of Colonial Wars, Society of Colonial Dames of America, Order of the Founders and Patriots of America, National Society of Scions of Colonial Cavaliers, National Society of Colonial Dames, Society of Daughters and Patriots of America, Order of Washington, Order of Pequot and King Phillip are other societies devoted to the Colonial period.

BADGE OF THE ORDER OF ST. PATRICK

The Society of the Cincinnati is one of the organizations going back to the wars which freed the United States from British control, membership being confined to the descendants of officers who served in the Continental army for at least three years. Other societies relating to the Revolutionary period are: Sons of Revolutionary Sires, Society of the Sons of the American Revolution, Naval Order of the United States, Military Order of Foreign Wars, Saint Nicholas Society of New York. Later organizations are the General Society of the War of 1812, Veteran Corps of Artillery, American Order of the Louisiana, Aztec Club, Association of Mexican Veterans,

Descendants of the Signers of the Declaration of Independence, Society of Dames of the Revolution, Daughters of the American Revolution, Children of the American Revolution, Society of the United States, Daughters of the Republic of Texas, Daughters of 1812.

The Military Order of the Loyal Legion is conspicuous among the societies relating to the Civil War, being modeled on the Society of the Cincinnati. Other Civil War organizations are: Grand Army of the Republic, Union Society of the Civil War, Union Veteran Legion, Sons of Veterans, Union Society of the Civil War, Society of the Army of Cumberland, Society of the Army of the Potomac, Society of the Army of Tennessee, Eleventh Army Corps Association, Second Army Corps Association, Thirteenth Army Corps Association, Union Society of the Civil War, Military Order of the Medal of Honor, National Association of Naval Veterans, Medal of Honor Legion, United Confederate Veterans, United Daughters of the Confederacy, United Sons of Confederate Veterans.

Before the war with Spain the Order of the Indian Wars and the Society of Veterans of Indian Wars were established. The Spanish War gave birth to the Naval and Military Order of the Spanish-American War, United Spanish War Veterans, Rough Riders' Association and others. Societies of a similar character are the American Scenic and Historic Preservation Society, Thomas Jefferson Memorial Association and the like.

The World War has likewise seen the formation of many societies, such as the American Legion and Veterans of Foreign Wars. The number of these societies is on the increase.

PATROCLUS, in Greek story, the friend of Achilles, whom he accompanied to the Trojan war. His success was at first brilliant; but, Apollo having stunned him and rendered him defenseless, he was slain by Euphorbus and Hector. See ACHILLES.

PATTEE, FRED LEWIS, an American educator, born in Bristol, N. H., in 1863. He was graduated from Dartmouth in 1888. From 1894 he was president of English literature at the Pennsylvania State College. He wrote "A History of American Literature," (1896); "The Foundation of English Literature," (1900); "History of American Literature Since 1870," (1915). He also wrote a book of poems and several other volumes of general literature.

PATTEN, SIMON NELSON, an American author and professor. Born at Sandwich, Ill., in 1852, and educated at Northwestern University, Illinois, and Halle, Germany. In 1888 he became professor of Political Economy at the University of Pennsylvania, a position which he held until his retirement in 1917. His most important work is his "Development of English Thought" in which he discusses the economic phases underlying the progress of ideas. The same thesis—economic explanation of social phenomena—underlies all his work. Some of his other important works are "Theory of Social Forces" (1896); "Heredity and Social Progress" (1903); "Social Basis of Religion" (1911); "Culture and War" (1916).

PATTESON, JOHN COLERIDGE, an English missionary; born in London, April 1, 1827, the son of Sir John Patteson, judge in the Queen's Bench, and of a niece of Coleridge, the poet. He passed through Eton and Balliol College, Oxford, elected a Fellow of Merton in 1852, and appointed curate of Alfington, Devonshire. But his thoughts turned to missionary work and in 1855 he sailed with Bishop Selwyn to New Zealand. The next 16 years he spent among the Melanesian Islands—New Hebrides, Banks, Solomon, and Loyalty Islands; and in 1861 he was consecrated Bishop of Melanesia. A most unselfish man and a true Christian, he was greatly beloved by the islanders, whom he protected against the white kidnappers of the Pacific. He was killed by the natives of Nukapu, one of the Santa Cruz group, Sept. 20, 1871.

PATTI, ADELINA MARIA CLORINDA, a popular operatic singer of Italian extraction; born in Madrid, Spain, in 1843. After a course of professional study she sang at an early age in New York. Her début in London took place in 1861 as Amina in "La Sonnambula," and she ever afterward was looked upon as one of the first singers of her time. Her voice was a high soprano, of rich bell-like quality and remarkable evenness of tone, with purity of style and high artistic finish. She won golden opinions on the Continent wherever she appeared, receiving, in 1870, the Order of Merit from the Emperor of Russia. Her greatest success was generally considered to be Marguerite in Gounod's "Faust." In 1868 she was married to the Marquis de Caux, from whom, however, she was divorced in 1876. She subsequently married M. Nicolini, and appeared in the United States, South America, and Mexico at various

times from 1880–1892. M. Nicolini died in 1898. In 1899 she married her third husband, Baron Rolf Cederstrom.

ADELINA PATTI

In 1903 Madame Patti made a successful concert tour of the United States. She died in 1919.

PATTISON, MARK, an English writer; born in 1813; was educated at Oriel College, Oxford; received a fellowship in 1839; and two years subsequently was ordained and won the Denyer theological prize. In 1853 he was appointed tutor of his college, and in 1861 became rector (or head) of Lincoln College. He devoted himself to university reform. He was a contributor to the famous "Essays and Reviews," and published "Pope's Epistles and Satires" (1869), "Isaac Casaubon" (1875), a memoir of Milton in the Men of Letters Series (1879), the "Sonnets of Milton" (1883), and numerous articles in reviews, etc. He died in 1884.

PATTON, FRANCIS LANDEY, an American educator; born in Warwick Parish, Bermuda, Jan. 22, 1843. Educated at Knox College, University of Toronto, and graduated at Princeton Theological Seminary in 1865. In 1865–1871 he was pastor of several churches; was then chosen McCormick Professor in the Theological Seminary of the Northwest; and in 1881 Professor of Relations of Philosophy and Science to the Christian Religion in Princeton University, the chair having been especially created for him. In 1888 he was chosen president of the university.

He resigned in 1902 and soon after was appointed President of the Princeton Theological Seminary. Publications: "The Inspiration of the Scriptures" (1869); "Summary of Christian Doctrines" (1874), etc.

PAU, the chief town of the French department of Basses-Pyrénées, on the right bank of the Gave-de-Pau, 66 miles E. S. E. of Bayonne and 143 S. S. E. of Bordeaux. It occupies a rocky height, 623 feet above sea-level, and commands toward the S. most magnificent views of the serrated Pyrénées. The ancient capital of the kingdom of Béarn and French Navarre, it has a noble five-towered castle, rising to a height of 110 feet, rebuilt about 1363 by Gaston Phœbus, Comte de Foix, and restored by Louis-Philippe and Napoleon III. Linen and chocolate are its chief manufactures; and in the vicinity Jurançon wine is grown, and many swine are fed, whose pork supplies the famous hams of Bayonne. Pop. about 40,000.

PAU, GENERAL PAUL MARY CÆSAR GERALD, a French general, born in Montélimar in 1848; graduated from Saint Cyr Military Academy in 1867, served in Franco-Prussian War as lieutenant of infantry, during which he lost his right arm. In 1897 he had attained

GENERAL PAU

the rank of brigadier-general, and of division in 1908. At the outbreak of hostilities, in 1914, he was given an important command in Alsace, where he remained till near the end of the year.

In 1915 he went on a diplomatic mission to Russia, the Balkans and Italy, and to Australia in 1918. He was a member of the Inter-Allied War Council and largely influenced Allied military plans on the western front.

PAUL, the name of five Popes, as follows:

PAUL I., Pope; the successor of Stephen, in 757. He engaged in dispute with Desiderius, King of the Longobards, but was taken under the protection of Pepin, King of the Franks. He died in 767.

PAUL II., Pope; succeeded Pius II. in 1464. He sought to organize a league of the Christian princes against the Turks, who at the time threatened to invade Italy, and also endeavored to establish peace among the different Italian States. He had a great dislike to profane learning, but he established the first Roman printing press (1463). He died in 1471.

PAUL III., Pope; named Alexander Farnese; was elected to the papal chair in succession to Clement VII. in 1534. In his reign the Council of Trent was called. He established the Inquisition, confirmed the Society of Jesuits, condemned the interim of Charles V., and acted with rigor against Henry VIII. of England. Died in 1549.

PAUL IV., Pope; Giovanni Pietro Caraffa; born in Naples, in 1476; succeeded Marcellus II., in 1555. He established a censorship, and completed the organization of the Roman Inquisition; he took measures for the alleviation of the burdens of the poorer classes, and for the better administration of justice. He was embroiled with the Emperor Ferdinand, with Philip II. of Spain, with Cosmo, Grand-Duke of Tuscany. He died in 1559.

PAUL V., Pope; Camillo Borghese, born in Rome, in 1552; was elected in 1605, after the death of Leo XI. He had a dispute with the senate of Venice, but it was so firmly resisted that the Pope excommunicated the doge and senate. He also raised forces against the republic; but the emperor and other states interfered and peace was restored (1607). He embellished Rome with sculpture and painting, and an aqueduct. He was the founder of the Borghese family, one of the wealthiest in Italy. He died in 1621.

PAUL I., Emperor of Russia; born in 1754. He was the only son of Peter III. and his wife, Catharine II. He lost his father when eight years old, and was brought up by his mother with great severity and in seclusion from public affairs. His marriage to the Princess Mary of Württemberg, in 1776, did not free him from harsh treatment till, on the death of Catharine, in 1796, he was proclaimed emperor. The hopes excited by some liberal measures in the first days of his reign were soon extinguished. He joined the second coalition against France; and Russian armies appeared in Italy under Suwarrof, in Switzerland, and in Holland. But he afterward withdrew from it, and entered into friendly relations with Napoleon. His conduct became intolerable, and seemed, in fact, that of a madman. At length a conspiracy was formed against him, with Count Pahlen at its head; and he was murdered in his bedroom, March 24, 1801.

PAUL, ST., one of the apostles of Jesus Christ; originally called Saul; a Hebrew of the tribe of Benjamin, and a native of Tarsus, the capital of Cilicia, and was born at the beginning of the Christian era. His father was a Pharisee of the most rigid cast, and Paul himself, up to the time of his conversion, was a most bitter and intolerant persecutor of the Christian sect; even assisting at the martyrdom of St. Stephen. The mode of his conversion is fully detailed in the New Testament. After his conversion, he was baptized at Damascus by Ananias; from whence, after a brief sojourn, he proceeded to Arabia, where he is supposed to have been fully instructed in the duties and doctrines of the new faith by special revelation. He was martyred about A. D. 66.

PAUL, ST., EPISTLES OF. There are 14 epistles in the New Testament usually ascribed to Paul, beginning with that to the Romans and ending with that to the Hebrews. Of these the first 13 have never been contested; as to the latter many good men have doubted whether Paul was the author, though the current of criticism is in favor of this opinion. These epistles, in which the principles of Christianity are developed for all periods, characters, and circumstances, are among the most important of the primitive documents of the Christian religion, even apart from their inspired character.

PAUL, ST. VINCENT DE, a Roman Catholic philanthropist; born of poor parents in southern France in 1576; was educated at Dax and Toulouse; ordained a priest in 1600; in 1605 he was captured by pirates; remained in slavery in Tunis for two years, and finally escaped to France. He afterward visited Rome, from whence he was sent on a mission

to Paris, where he became almoner to Queen Margaret of Valois. In 1616 he began the labors which occupied so large a portion of his life, and which included the foundation of the institution called the "Priests of the Mission or Lazarists," the reformation of the hospitals, the institution of the Sisterhood of Charity, the instruction of idiots at his Priory of St. Lazare, etc. Among the last acts of his life was the foundation of an asylum for aged working people of both sexes, and a hospital for all the poor of Paris, which was opened in 1657. He was canonized in 1737. He died in 1660.

PAULDING, JAMES KIRKE, an American author; born in Dutchess co., N. Y., Aug. 22, 1779. Self-educated, he early showed a tendency to literature, and, being a friend of Washington Irving, wrote a portion of "Salmagundi." During the War of 1812 he published the "Diverting History of John Bull and Brother Jonathan"; and in 1814, "The United States and England," a defense against articles in the "Quarterly Review." This gained him an appointment on the Board of Naval Commissioners. He still continued to write minor satires and humorous sketches, and in 1831 published the very successful novel, "The Dutchman's Fireside," and in 1832 "Westward Ho!" "Life of Washington" (1835) and "Slavery in the United States" (1836), in which the institution is defended on social, economical, and physiological grounds. In 1837 Van Buren appointed him Secretary of the Navy. He died at Hyde Park, N. Y., April 6, 1860.

PAULINUS, an English missionary to Northumbria, counted as the first of the archbishops of York. He was a native of Rome. He was sent on his mission by Gregory in 601, and first labored under Augustine in the evangelization of Kent. By him he was consecrated bishop in 625, when he accompanied Ethelburga on her marriage to the still heathen Edwin, King of Northumbria. For a long time he made no progress; but at length a great gathering was held at Goodmanham, near York, and Edwin and his court submitted to baptism at York, in a wooden chapel dedicated to St. Peter, the foundation of the Minster, Easter Sunday, 627. Paulinus now carried the Gospel over Northumbria, but after six years' constant labor the death of Edwin in battle at Hatfield put a sudden end to his work. In the same year he received the "pallium" as Archbishop of York from Rome, but he never returned, dying Oct. 10, 644. He was buried in the chapter house at Rochester.

PAULIST FATHERS, a modern American society in the Roman Catholic Church, founded in New York by the late Rev. Isaac T. Hecker, in 1858. It is composed of priests who are engaged in missionary and literary work. In their work they adopt methods suitable to the customs of the United States, but foreign to those of the Catholic Church in general. By this they have brought upon themselves severe criticism from conservative members of the church in Europe, and are accused of a desire to build up an American church. Their distinctive work is the endeavor to reach non-Catholics, and so they hold their meetings in the open air, or in school houses and town halls in preference to a church; they also use congregational singing, and hymns of the Protestant church. They have a printing plant of their own and conduct a monthly magazine called the "Catholic World."

PAULUS HOOK, FORT, a Revolutionary fortress erected by the British on the site of Jersey City, N. J.

PAUR, EMIL, an Austrian conductor and pianist. Born in Austria-Hungary 1855 he became a student in the Vienna Conservatory and in 1876 became kapellmeister at Cassel. In 1891 the Leipzig Stadt Theater elected him director and in 1893 he made his first trip to America to succeed Arthur Nikisch as conductor of the Boston Symphony Orchestra. From 1899–1900 he conducted at the Metropolitan Opera House. In 1903 he returned to Europe, this time to Madrid to the Royal Opera. The next year the Pittsburgh Symphony Orchestra made him their conductor, where he remained until his return to Berlin in 1912 to become the conductor of the Royal Opera.

PAUSANIAS, a Lacedæmonian general, nephew of Leonidas. He commanded the allied Greeks against the Persians at the battle of Platæa in 479 B. C. He afterward, with a combined Greek fleet, delivered Greece, Cyprus, and finally Byzantium from the Persian rule. He entered into secret negotiations with Xerxes and planned to make himself master of Greece. To escape arrest he sought shelter in the temple of Athene at Sparta, where he was shut in by the enraged people and starved to death (467 B. C.).

PAVEMENT, the hard covering of the surface of a board or footway; a floor or covering of stones, brick, wood, etc., laid evenly on the earth, so as to form a level,

hard, and convenient passage. Among the pavements now in use the most common are macadam, granite cubes, asphalt, and wood, etc. Also a decorative or ornamental flooring of colored or plain tiles, stones, or brick.

PAVIA, a city of northern Italy, capital of a province of same name, on the Ticino, 19 miles S. of Milan. In the cathedral, commenced in 1448, but never finished, are the ashes of St. Augustine, in a sarcophagus ornamented with 50 *bassi-rilievi*, 95 statues, and numerous grotesques. The Certosa of Pavia, the most splendid monastery in the world, lies 4 miles N. of the city. It was founded in 1396, contains many beautiful paintings, and abounds in the richest ornamentation. The University of Pavia is said to have been founded by Charlemagne in 774. It consists of numerous colleges, a library of 120,000 volumes, a numismatic collection, anatomical, natural history, and other museums, a botanic garden, a school of fine arts, etc. The university is attended by about 1,600 students. Manufactures silk. Here, Feb. 24, 1525, took place the battle of Pavia (sometimes called the second battle of Marignano), in which the Imperialists, under Lanney, defeated the French, and took François I. prisoner. Pop. about 45,000.

PAWNBROKER, one who is licensed to lend, or make a business of lending money on goods pawned or pledged.

PAWNEES, a tribe of American Indians who formerly resided in Nebraska, with branches extending into Kansas and Texas. They surrendered their lands S. of the Platte by treaty in 1833; suffered much thereafter at the hands of their hereditary enemies, the Sioux; and in 1876 removed, only 2,026 strong, to a reservation of 283,020 acres in Indian Territory. They numbered less than 1,000 in 1920.

PAWTUCKET, a city in Providence co., R. I., on the Pawtucket river, at the head of navigation, and on the New York and New England, and the New York, New Haven and Hartford railroads; 4 miles N. of Providence. The river here falls 50 feet, and this fact, with its proximity to the sea, led Samuel Slater in 1790 to select it as the site for the first cotton factory built in the United States. Here are water-works, public library, public and parochial schools, street railroad and electric light plants, National and savings banks, and several daily and weekly newspapers. It has about 500 manufacturing establishments, among which the most important are cotton, woolen, and hair cloth mills, machine shops, and foundries, print works, and extensive thread mills. Pop. (1910) 51,622; (1920) 64,248.

PAX, the Roman goddess of peace.

PAX, in Church history, the kiss of peace. In the early Church the Roman *osculum* was adopted and raised to a spiritual significance (Rom. xvi: 16; I Cor. xvi: 20; II Cor. xiii: 12; I Thess. v: 26). To obviate possible danger from this custom, the Apostolic Constitutions strictly decreed the separation of the sexes at public worship. The pax was given at mass in the Western Churches till the 13th century, when Archbishop Walter in 1250 introduced the metal pax, and its use spread to the Continent. The pax is now only given at high masses, and the formal embrace substituted for the kiss is confined to those in the sanctuary. Also an osculatorium; at first probably a crucifix, then a plate of metal adorned with a figure of Christ crucified, or some other pious picture or emblem, passed among the congregation to be kissed as a substitute for the actual kiss of peace. Its use is almost entirely confined to religious houses and seminaries. Called also Instrumentum, Tabella Pacis, Pacificale, and Freda.

To give the pax, to exchange the formal embrace now substituted for the kiss of peace.

PAXO (ancient Paxos), one of the Ionian Islands, lies S. E. of Corfu, has, with the smaller island of Antipaxo (1 square mile), an area of 8½ square miles. Pop. (1920) about 5,000. Produces wine, olives and olive oil, almonds, oranges, lemons, etc. Capital, Gaïon, the seat of a bishop.

PAYMASTER, an officer in the army and navy, from whom the officers and men receive their wages. In matters of general discipline the paymaster is subordinate to the commanding officer of his regiment; but in regard to the immediate duties of his office he is directly responsible to the war office.

PAYN, JAMES, an English novelist; born in Cheltenham, England, in 1830; was graduated at Cambridge in 1854. From 1858 he edited "Chambers' Journal," for which he wrote exclusively for many years. In 1882 he became editor of the "Cornhill Magazine." His works reach upward of 100 books, the best known being: "Lost Sir Massingberd"; "By Proxy"; "The Luck of the Darrells"; "The Talk of the Town"; "Some Literary Recollections" (1886); and

"Gleams of Memory" (autobiographical), (1894). "The Disappearance of George Driffield" (1896); "Another's Burdens" (1897). He died in London, March 25, 1898.

PAYNE, BRUCE RYBURN, an American educator, born at Morganton, N. C., in 1874. He graduated from Trinity College, N. C., in 1896. After serving as instructor in several institutions he was appointed professor of philosophy and education in William and Mary College in 1904. From 1906 to 1911 he was professor of psychology at the University of Virginia. In the latter year he was appointed president of the George Peabody College, of Nashville, and was a member of many important societies, and was the author of the work of educational systems in various European countries.

PAYNE, JOHN, an English poet and Oriental scholar; born in London, Aug. 23, 1842. He studied for the bar, and in 1867 became a solicitor. Among his works are: "The Masque of Shadow" (1870); "Intaglios" (1871); "Songs of Life and Death" (1872); "Lautrec" (1878); a translation of the "Poems of Francis Villon" (1878); "New Poems" (1880); "Francis Villon—a Biographical Study" (1881); a close and scholarly translation of the "Arabian Nights' Entertainments," with the addition of those volumes of "Arabian Tales" not included in the common (1882); and a translation of the "Rubáiyát" of Omar Khayyám, including over 800 quatrains, several hundred more than had been before translated (1897). He also made a translation of Dante's "Divina Commedia," which was unpublished. He translated and adapted a number of works including "Poems of Hafiz" (1901); "Flowers of France" (1907) etc. Died 1916.

PAYNE, JOHN BARTON, Secretary of the Interior of the United States. Born in Virginia 1855, and admitted to the bar in West Virginia in 1876. In 1883 he removed to Chicago where he practiced law and in 1893 was elected Judge of the Supreme Court of Cook co. In 1898 he resigned his judicial position and entered the firm of Winston, Payne, Strawn and Shaw, in which he remained until 1918. In that year he became counsel for the Shipping Board of the United States Government and later became its chairman. In 1920 President Wilson appointed him Secretary of the Interior.

PAYNE, JOHN HOWARD, an American dramatist; born in New York, June 9, 1792. At the age of 16 he made his first appearance at the Park Theater in the character of Young Norval with brilliant success. He also played in England and Ireland. He visited London in 1813 and there founded "The Opera Glass." In 1832 he retired from the stage and in 1851 was appointed United States consul to Tunis. He wrote, translated and adapted over 60 plays, but is most famous as the author of "Home, Sweet Home," originally in the opera of "Clari." He died in Tunis, April 10, 1852. In 1883 his remains were removed to the United States and interred in Oak Hill cemetery, near Washington, D. C.

JOHN BARTON PAYNE

PAYNE, SERENO ELISHA, American legislator. He was born at Hamilton, N. Y., in 1843, studied at the University of Rochester, and was admitted to the bar in 1866. He became first city clerk, then supervisor, district attorney and head of the education board at Auburn and, elected in 1883, for almost thirty years served in the House of Representatives. In politics he was a Republican, and specialized in tariff legislation, being largely responsible for the Payne-Aldrich Act of 1909. He died in 1914.

PAYNE, WILL, an American journalist, born in Whiteside co., Ill., in 1865. He was educated in the common schools. In 1890 he began newspaper work in

Photo, Ewing Galloway

AVENUE OF ROYAL PALMS, NEAR HAVANA, CUBA

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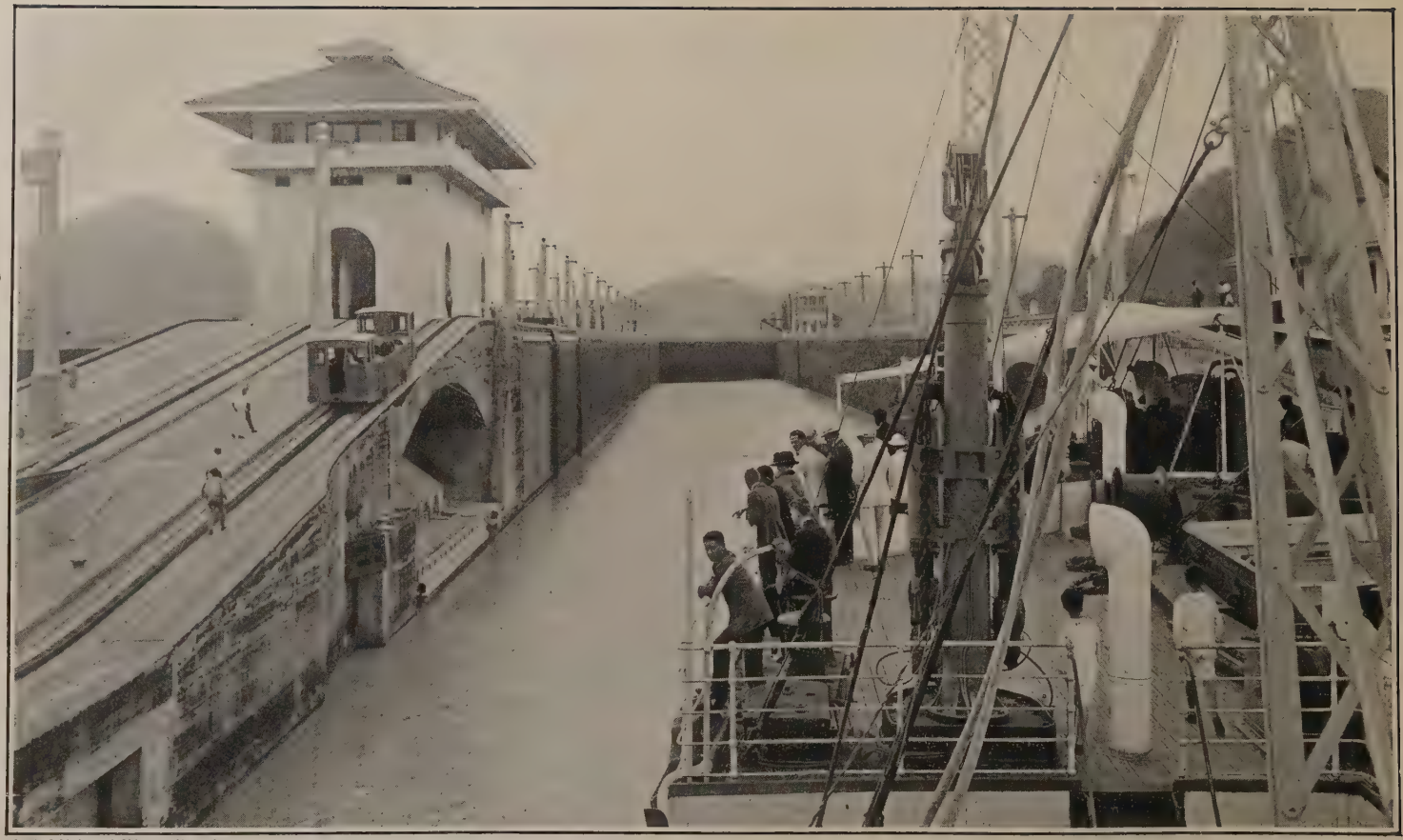

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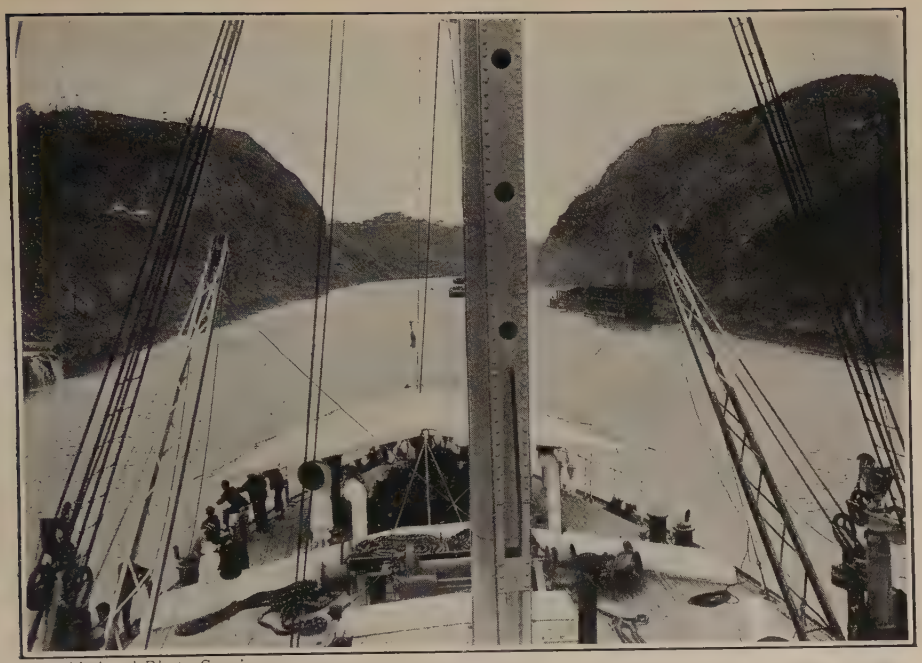
PASSING THROUGH THE PEDRO MIGUEL LOCKS, PANAMA CANAL



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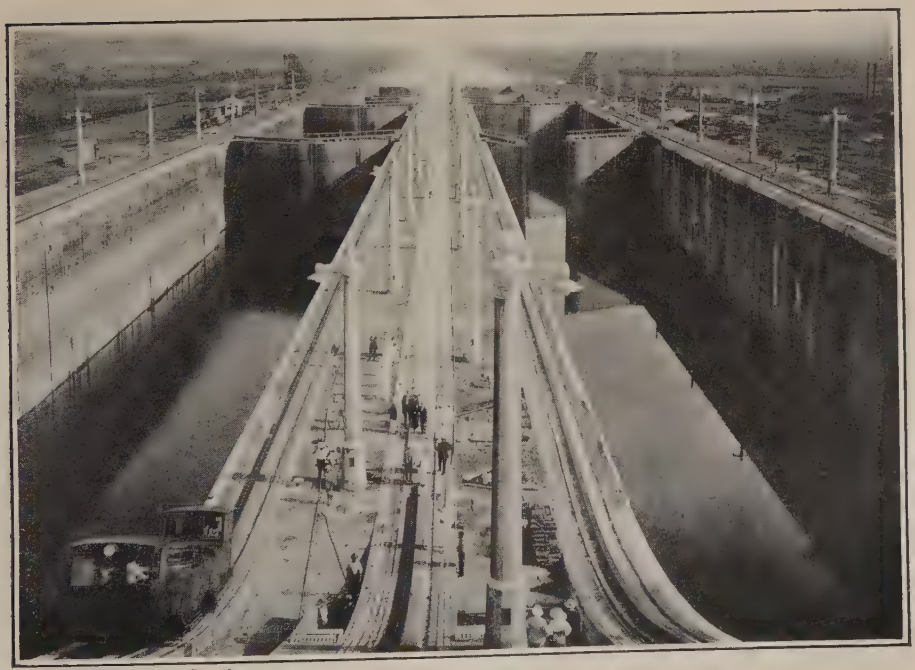
THE GAILLARD CUT, PANAMA CANAL



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GATUN LOCKS, PANAMA CANAL

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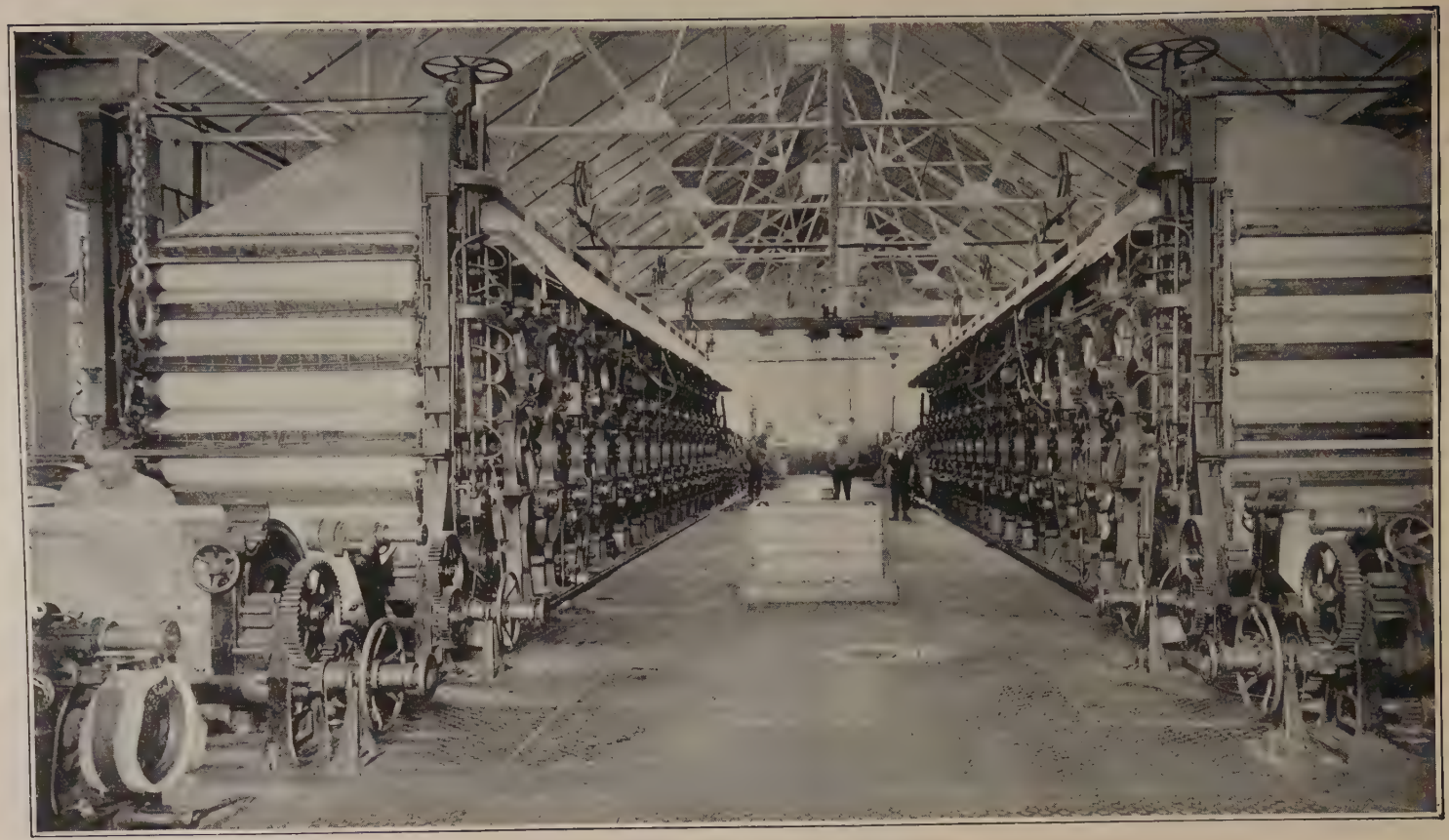
PULP ROOM IN A PAPER MILL IN MAINE



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PAPER MACHINE IN A CANADIAN PAPER MILL

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AN AVIATOR'S VIEW OF PARIS. IN THE CENTER IS THE PLACE DE L'OPERA

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PARIS AND THE SEINE. THE ISLAND IN THE FOREGROUND IS ILE DE LA CITE. THE OTHER IS ST. LOUIS

Photo, Publishers' Photo Service

THE CITY OF PARIS, SHOWING SEVEN OF THE BRIDGES OVER THE SEINE

Chicago and served as reporter, editorial writer, and editor on the Chicago "Daily News," from 1890 to 1896. He was financial editor of the Chicago "Chronicle" in 1896 and 1897, and the "Economist" in 1897 to 1904. He was a member of the American Institute of Arts and Letters. He wrote "Jerry the Dreamer," 1896; "The Story of Eva," 1901; "The Automatic Capitalist," 1909; "The Losing Game," 1909. He also contributed short stories to magazines.

PAYNE, WILLIAM MORTON, American educator and author. He was born at Newburyport, Mass., in 1858, and after leaving school held a position in the Public Library at Chicago, taught in high school, and acted as literary editor of the Chicago "Morning News," Chicago "Evening Journal," and "Dial." He varied the rest of his time by writing books and lecturing. His works include: "The New Education"; "Little Leaders"; "Various Views"; "Greater English Poets of the Nineteenth Century"; "Leading American Essayists"; "Björnstjerne Björnson"; and translations of Segurd Slembe and Ibsen. He died in 1919.

PEA, *pisum sativum,* an annual with a rounded stem, many alternate compound leaflets, two stipules larger than the leaflets, and tendrils at the extremity of the stems or branches. Peduncle axillary, one or more commonly two flowered; flowers white or pale violet; legumes oblong or scimiter shaped, pendulous. It is believed that the pea is a native of southern Europe. It has run into many varieties.

PEABODY, a town in Essex co., Mass.; on the Boston and Maine railroad; 2 miles W. of Salem. It comprises North Peabody, South Peabody, West Peabody, and a number of other villages. Here are the Peabody Institute and Library, the Sutton Reference Library, a high school, and National and savings banks. It has manufactures of leather, morocco, sheep skin, boots and shoes, woolen goods, electric supplies, thermometers etc. Prior to 1868 the town was called South Danvers; and was then named Peabody in honor of George Peabody, who was born here. Pop. (1910) 15,721; (1920) 19,553.

PEABODY, GEORGE, an American philanthropist; born in Danvers, Mass., in 1795. He was descended from an English family, and his parents being poor, George received but a scanty education, becoming grocer's clerk at the age of 11. He became chief clerk, and, afterward, partner with his uncle, John Peabody, in Georgetown, D. C., in 1812. Not satisfied, however, with their business relations, George left his uncle and joined partnership with Mr. Elisha Riggs in the drygoods business in Baltimore, in 1815. In 1837 he withdrew from the firm, and established himself as banker in London, where he amassed a fortune which enabled him to fully carry out his benevolent ideas. He was particularly devoted to promoting education. Commencing with his native place of Danvers, Mass., where he bestowed $270,000 for the cause of education, his purse was always open to assist the good work, not only in the land of his birth, but throughout the world. To the city of Baltimore he donated for this purpose the sum of $1,400,000; to the Board of Trustees for the promotion of education in the South, he gave $3,500,000. In 1862 he established a Board of Trustees for the amelioration of the condition of the poor of London, to which he contributed at various times the amount of $2,500,000. After his decease, in 1869, his remains were, by command of Queen Victoria, temporarily interred in the royal vault in Westminster Abbey and, subsequently, conveyed with state by the British ship of war "Monarch," escorted by an American war-steamer, to the United States, to be finally deposited, amid imposing manifestations of international respect, at Danvers (now Peabody), Mass., in March, 1870.

PEABODY, GEORGE FOSTER, an American banker and philanthropist. Born at Columbus, Ga., July 27, 1852. After completing his education he entered business and rapidly attained distinction. Many of his investments have been in Mexico. He became president of the Compañia Metallurgica Mexicana and a director in at least five or six other concerns with holdings in Mexican copper and lead. In politics he belongs to the Democratic party, being treasurer of the National Committee from 1896 to 1905. A great deal of time and money have been spent by Mr. Peabody in the cause of Southern education. He is a trustee of both Hampton and Tuskegee Institutes.

PEABODY, JOSEPHINE PRESTON, an American poet and dramatist. She was born in New York, was educated at Radcliffe College, and for two years ending in 1903 taught literature at Wellesley. She married Prof. Marks in 1906. Her works include "The Wayfarers"; "A Book of Verse"; "Fortune and Men's Eyes"; "New Poems, with a Play"; "Marlowe," a drama; "The Singing Leaves"; "The Wings," a drama; "The

Book of the Little Past"; "The Piper," a drama which won the Stratford-on-Avon prize in 1910; "The Singing Man"; "The Wolf of Gubbio"; "New Poems."

PEACE MOVEMENT, THE. Men have dreamed of universal peace at least since the days of the Hebrew prophets and the early Church fathers. The Latin poets too, Vergil in particular, had their conception of a *Pax Romana*. In the Middle Ages Dante in his "De Monarchia" (c. 1300) laid down some general principles that are the forerunners of arbitration. But it was not until two or three centuries later that definite plans were formulated for a world parliament and a world court. The most famous proposals were those of the King of Bohemia (1462) for an international parliament backed by an international military force; of Emeric de Lacroix (1623) for a permanent congress of nations sitting at Venice with universal free trade; of the great jurist, Grotius (1625) who in his famous "De Jure Belli et Pacis" argued for an international congress and an arbitration tribunal; of William Penn (1693) who proposed a representative congress of nations, an arbitration tribunal and the proposal of coercion of any state which should refuse to submit disputes to arbitration. During the eighteenth century there was a growing interest in world federation; but it was more prevalent among philosophers such as Leibnitz, Jeremy Bentham and Kant than among statesmen and men of affairs. After the Napoleonic wars there was much popular support of the idea of world peace; but the formation of the Holy Alliance (1815), ostensibly designed to prevent war, degenerated into an agency of reaction.

That same year (1815) there was founded the first Peace Society the world ever saw. It was established in New York by the merchant David Low Dodge; and in 1815 the Massachusetts Peace Society was started in Boston by Noah Worcester and William Ellery Channing. By 1826 there were about fifty peace societies in existence in America, the most notable being the American Peace Society organized in 1828 in New York by William Ladd. Indeed the first half of the nineteenth century is marked by the popularization of the Peace Movement through societies and lectures such as those of Charles Sumner. In 1816 a Peace Society was formed in London, and in 1830 in Geneva. In 1843 an international peace congress was held in London; the ideas advanced were those already familiar, although the enforcement of the decrees of the arbitration tribunal was to be left to international public opinion. In 1847 Elihu Burritt, "the learned blacksmith" of Connecticut, went to Europe to agitate for a congress and court of the nations. The next year a peace congress was held at Brussels, and in 1849 another congress met there under the presidency of Victor Hugo. An interesting feature was the introduction of the peace movement into the legislative bodies of various States. The resolution of Massachusetts in 1832 in favor of arbitration led the way; in 1837 a petition was presented to Congress; and in 1853 a resolution in favor of international arbitration was adopted by the United States Senate. The movement spread rapidly. Leading statesmen, including Cobden, Peel, Disraeli and Garibaldi, supported it; and even Napoleon III. is credited with the desire to call a European Congress to bring about arbitration and the limitation of armaments. But Prussia objected.

During the next thirty years the advance of the peace movement was delayed by the Crimean War, our Civil War, and wars in Italy, Austria, France and Germany. There were, to be sure, many peace societies formed; and eminent European jurists influenced the future development of the movement by emphasizing the necessity of a legal basis for international relations. Arbitration treaties won more and more popular support. In 1887 an English delegation under the leadership of William Randall Cremer, member of Parliament, visited America to lay before President Cleveland a document signed by 232 members of Parliament in favor of a British-American arbitration treaty. In 1889 the first World's Peace Congress was held at Paris. During the next decade the movement spread rapidly; the well known Lake Mohonk conferences in the United States begun in 1895; the work of J. de Bloch on war published in 1898, and the attitude of the Socialist and Labor parties in Europe were important factors.

An important step forward was taken when on May 18, 1899, the first Peace Conference called by the Czar of Russia met at The Hague. Twenty-one European states were represented as well as the United States, Mexico, China, Japan, Persia and Siam. The most important act was the establishment of a Permanent Court of Arbitration sitting at The Hague. It is to the credit of the United States that after this court had met for two years without being called to adjudicate, President Roosevelt at the suggestion of Baron d'Estournelles de Constant, arranged with President Diaz of

Mexico to send to the Tribunal the so-called "Pious Fund Case." Roosevelt also referred to The Hague the Venezuelan case which had been sent to him for arbitration.

The United States was also instrumental in calling the second Hague Peace Conference which finally assembled, again upon the invitation of the Czar of Russia, on June 15, 1907. This time forty-four nations were represented. "Here for the first time practically the whole world met together under one roof and for world business." If the practical results were disappointing, the conference nevertheless adopted some important conventions looking to the pacific settlements of international disputes; to limitations upon the use of force for the collection of debts, and to the regulation of explosives in time of war. At this conference preliminary steps were taken for the summoning of a third Conference in 1915; but of course the World War (1914–1918) effectively interfered with the undertaking.

The World War also ended for a while the peace propaganda in the belligerent countries, although it accentuated the need of a better world organization. In 1914 there was started in England a movement to do away with secret diplomacy under the name of the Union for Democratic Control. In 1915 in the United States there was organized the League to Enforce Peace, having for its object the formation of a league of nations bound by treaty to arbitrate all disputes and to use joint military force to coerce recalcitrant members. Of this league ex-President Taft was president. It won a good deal of popular support and was particularly active in the days of the Paris Conference which met at the end of the war.

Since 1918 most of the discussion of the Peace Movement has centered about the LEAGUE OF NATIONS (*q. v.*). The objects of the League as stated in the preamble are:

"To promote international co-operation and to secure international peace and security by the acceptance of obligations not to resort to war, by the prescription of open, just and honorable relations between nations, by the firm establishment of the understandings of international law as the actual rule of conduct among governments and by the maintenance of justice and a scrupulous respect for all treaty obligations in the dealings of organized peoples with one another."

The Covenant of the League of Nations was made an integral part of the Treaty of Versailles which during the year 1919 was ratified by all the leading nations of the world with the exception of the United States. The League was formally organized in 1920 with a permanent Secretariat seated now in Geneva, Switzerland. The Council of the League consisting of representatives of nine powers, including the United States, held two sessions without, however, the presence of any representative of the United States, and the Assembly of the League, consisting of representatives of all the nations that have ratified the Covenant, met in September at Geneva.

In the United States the rejection by the Senate of the Treaty of Versailles with the Covenant of the League was undoubtedly a disappointment to many who were eager for world peace. Others, however, felt that the Covenant had many faults and that the United States could contribute more by forming another less rigid association of nations or by holding to its traditional aloofness from European affairs. In the campaign of 1920 both great political parties asserted interest in the cause of world peace, the Democrats indorsing without reserve the Covenant of the League, and the Republicans advocating measures that would promote world peace without committing this country to all the obligations of the League.

Since the election of Mr. Harding there has been continued discussion of the best methods to promote peace. The World War has had great influence upon the whole peace movement, on the one hand by showing the fallacies of pacificism, and on the other hand by emphasizing the need of better world organization. It needs no prophet to assert that in the coming generation the peace movement will develop along the lines of a league to enforce peace, an international court and limitation of armaments.

PEACE TREATY. The treaty of peace between the United States of America, British Empire, France, Italy, Japan, Belgium, and other allied countries with Germany, were signed at Versailles, on June 28, 1919. This treaty formally ended the World War. The combined provisions for cession of territory belonging to Germany, for reparation, for the payment by Germany of the costs of occupation of its territory by the forces of the Allied Powers, and provisions for the reduction of armament by Germany. Commissions were appointed to enforce the terms of the treaty which is known as the Treaty of Versailles. See TREATY OF VERSAILLES.

PEACH, the delicious fruit of *Amygdalus Persica,* the peach tree, genus

Amygdalus. It is distinguished by oblong, lanceolate cerrulate leaves; solitary flowers, of a delicate pink color, appearing before the leaves; and the sarcocarp of the drupe succulent and tender, not fibrous as in the almond. Many varieties are cultivated in the United States, and form an important branch of commerce, chiefly in Pennsylvania, Maryland, New Jersey, Delaware, western New York, and southern Illinois, and California. Much of it is canned, preserved, and dried for the home and foreign markets.

PEACOCK, any individual of the genus *Pavo*, specifically, the common peacock (*P. cristatus*), a native of India, domesticated in Great Britain. The plumage is extremely gorgeous. Crest

PEACOCK

of about 24 feathers, webbed only at tip; green, with blue and gold reflections. Bill and legs horny brown.

The peahen is chestnut-brown about the head and nape; breast and neck greenish, edged with pale whity-brown; upper plumage light brown, with faint wavings, increased on upper tail coverts; tail deep brown with whitish tips; abdomen white; lower parts and under tail coverts brown. Length 38 to 40 inches; crest shorter and duller than in the male. Among the Greeks and Romans the peacock was sacred to Hera or Juno. Quintus Hortensius (born 119 B. C.) was the first to serve up peacocks at table. The proverbial reproach "vain as a peacock," is scarcely well-founded. The display of his train is intended to attract the attention of the hen bird, or to outshine the display of some rival.

PEACOCK, THOMAS LOVE, an English writer; born in 1785. His first important work was a novel entitled "Headlong Hall," published in 1815, and this was followed by "Melincourt," "Nightmare Abbey," "Maid Marian," the "Misfortunes of Elphin," "Crotchet Castle," "Gryll Grange," and a poem called "Rhododaphne." He was the friend and executor of Shelly, and was connected with the East India Office for nearly 40 years. He died in 1866.

PEACOCK BUTTERFLY, the *Vanessa io*, a beautiful butterfly, two and one-half, or two and three-quarter inches across the wings, which are a dull, deep red, each with an eye-like spot. Larva spiny, black, with many white dots. It is seen in numbers, on the tops of nettles, in June and July. The perfect insect appears in August, lives through the winter, and is seen in March and April.

PEALE, REMBRANDT, an American artist; born in Bucks co., Pa., Feb. 22, 1778. When 17 years old executed a portrait of Washington, from whom he had three sittings. He painted portraits of many distinguished men. He was president of the American Academy, and also one of the original members of the Academy of Design. His portrait of Washington (1823) was purchased by Congress. He died in Philadelphia, Pa., Oct. 3, 1860.

PEANUT, the pod of the *Arachis hypogæa.* The plant is an annual of diffuse habit, with hairy stem, with two paired, abruptly pinnate leaflets. The flowers above ground are sterile, and the pods or legumes are stalked, oblong, cylindrical, and about one inch in length. After the flower withers, the stalk of the ovary has the peculiarity of elongating and bending down, forcing the young pod under ground, and thus the seeds become matured at some distance below the surface. As to the native country of the peanut the opinions of botanists are divided between Africa and America. It is extensively cultivated in all tropical and subtropical countries, especially in

America, Africa, India, the Malayan Archipelago, and China. The plant affects a light sandy soil, and is very prolific. The pods when ripe are dug up and dried. When roasted they are sweet and palatable. Vast quantities are used in confectionery and the manufacture of peanut butter. The nuts yield an excellent substitute for olive oil. Before the World War the world production of peanuts was over 600,000,000 pounds, of which the United States contributed 5 per cent.

PEANUT OIL. Arachis Oil. A pale yellow oil with the characteristic odor and flavor of peanuts. Specific gravity 0.919. Soluble in all common oil solvents. Obtained by pressing peanuts, either with or without the application of heat. Pressing usually takes place in three stages, first in the cold, when the choicest oil is obtained, then at a temperature of about 30° C., when a lower grade oil is produced, and finally, at a temperature of 55° C., the product being a dark colored oil used in soap manufacture. The better grades of oil are deodorized by treatment with live steam, and bleached with fuller's earth or carbon. Refined peanut oil is largely used as a salad oil and for culinary purposes.

PEAR, the *Pyrus communis.* It is a shrub or small tree, 20 to 40 feet high, with the branches more or less spinescent and pendulous, the flowers in corymbose cymes, and the fruit pyriform, one or two inches long, becoming larger and sweeter in cultivation. Many hundred cultivated varieties exist. The wood of the pear is almost as hard as box, and is sometimes used as a substitute for it by wood engravers.

PEARCE, WILLIAM, an American Methodist Episcopal bishop; born at Hayle, Cornwall, England, in 1862. He came to the United States in 1884 and was ordained minister of the Free Methodist Church in 1888, afterward serving in several pastorates in California, Oregon, and New York. He was appointed bishop of the Free Methodist Church in 1908. He was a delegate to the World's Missionary Convention in 1910.

PEA RIDGE, a post village in Benton co., Ark.; about 8 miles E. of Bentonville. Here, on March 6, 7, and 8, 1862, occurred one of the most desperate battles of the Civil War. Gen. Samuel R. Curtis, in command of about 11,000 Union troops, with 49 pieces of artillery, was attacked by a superior force of Confederates (said to number 20,000) under Gen. Earl Van Dorn, and a series of obstinate and sanguinary conflicts ensued; which, lasting through three days, finally ended with the withdrawal of Van Dorn. The total Union loss was 1,351; that of the Confederates, though never officially reported, is supposed to have been more severe.

PEARL, a peculiar product of certain marine and freshwater mollusks or shellfish. Most of the molluscous animals which are aquatic and reside in shells are provided with a fluid secretion with which they line their shells, and give to the otherwise harsh granular material of the shell a smooth surface, which prevents any unpleasant friction. The material in its hardened condition is called nacre by zoölogists, and by dealers mother-of-pearl. Detached and generally spherical or rounded portions of the nacre are often found on opening the shells, due to the intrusion of a grain of sand or other substance, which, by irritating the tender body of the animal, obliges it in self-defense to cover the cause of offense which it has no power to remove; and as the secretion goes on regularly to supply the growth and wear of the shell the included body constantly gets its share, and thereby continues to increase in size till it becomes a pearl. The true pearl of price is only found in the pearl oyster. The most famous pearls are those from the East; the coast of Ceylon or Taprobane, as it was called by the Greeks. They are, however, obtained now of nearly the same quality in Panama in South America, St. Margarita in the West Indies, the Coromandel coast, the shores of the Sooloo Islands, the Bahrien Islands, and the islands of Karak and Corgo in the Persian Gulf. The pearls of the Bahrien fishery are said to be even finer than those of Ceylon.

The single pearl which Cleopatra is said to have dissolved and swallowed was valued at $400,000, and one of the same value was cut into two pieces for earrings for the statue of Venus in the Pantheon at Rome. False pearls are manufactured extensively. The finest and costliest imitations could only be distinguished from the real by an expert. Roman pearls differ from other artificial pearls by having the coating of pearly matter on the outside, to which it is attached by an adhesive substance. The art of making these was derived from the Chinese.

The Chinese have long been in the habit of introducing grains of sand and little knots of wire into the shell of the pearl oyster, in order that the animal,

to relieve itself from the irritation so caused, may coat the foreign substance with pearl.

PEARL HARBOR, a United States coaling station at the island of Oahu, Hawaii; acquired prior to the annexation of the islands. The harbor has been strongly fortified, and is a United States naval station. It was an important point during the World War.

PEARLY NAUTILUS, the *Nautilus pompilius;* common in the Pacific and Indian Oceans, especially toward the Moluccas. It is believed to inhabit both deep and shallow water. Its fine mother-of-pearl is much in request with cabinet makers and jewelers. The smallest and most excavated partitions are used to make pendants for the ear. By removing the external layer of the shell which is not nacreous, drinking vessels of great brilliancy are made in the East, as they formerly were also in Europe.

PEARSON, SIR (CYRIL) ARTHUR, English newspaper proprietor. He was born at Wookey, England, in 1866, and began his newspaper career on Sir George Newnes' "Tit-Bits," which enjoyed a circulation till that time unknown in England. He later started "Pearson's Weekly" on the same lines, following this with similar journals. In 1900 he started the "Daily Express" in imitation of the "Daily Mail," which had then an enormous circulation. Like Harmsworth, later Lord Northcliffe, he came into ownership of many journals. Later he lost his eyesight, and has since devoted himself to philanthropic work among the blind. He was made baronet in 1916, and in 1919 wrote "Victory Over Blindness."

PEARSON, KARL, an English physicist. He was born in 1857 and studied at Cambridge, Heidelberg, and Berlin, being admitted to the bar in 1882. He taught mathematics in University College, London, and became Galton professor of eugenics in London University. His works include: "History of the Theory of Elasticity and Strength of Materials"; "Ethic of Freethought"; "Grammar of Science"; "The Chances of Death"; "National Life from the Standpoint of Science"; "The Life, Letters and Labors of Francis Galton."

PEARY LAND, an area along the most northern coast of Greenland, discovered in 1882 by Lockwood and Brainard and later further explored by Peary in 1892.

PEARY, ROBERT EDWIN, an Arctic explorer and civil engineer in the United States navy; born in Cresson, Pa., May 6, 1856; was graduated at Bowdoin College, and in 1885 became a civil engineer in the United States navy, with the rank of lieutenant. In 1886 he made a journey of reconnoisance to Greenland, advancing for over 100 miles on the interior ice. In 1891 and 1893 he made other trips to the Polar regions, in which he was accompanied, as far as the winter quarters, by his wife, Josephine Diebitsch Peary, author of "My Arctic Journey." In these expeditions he made excursions on a sledge along the coast of Greenland, and traversed the inland ice from McCormick Bay to the N. E. angle

ROBERT E. PEARY

of Greenland (Independence Bay). He proved the convergence of the E. and W. coasts of northern Greenland, and almost with positiveness the insularity of the mainland. He discovered new lands (Melville Land and Heilprin Land), and named many glaciers. In May, 1896, Lieutenant Peary made a successful expedition to Greenland for the purpose of collecting specimens in natural history. He returned to Cape Breton, September 27. In 1897 he was given leave of absence by the government for the purpose of continuing his explorations, and to establish a station in the far N. of Greenland, which should be provisioned and supplied and made the basis of a series of annual expeditions into the Polar regions. He went N. in the summer of 1897 to take the necessary preliminary measures, such as securing the aid of the Eskimos, fixing the site of a station, etc. He returned in October of that year, bringing with him an immense mass of meteoric iron, or what is supposed to be such, from Cape York,

Greenland, which was placed in the Museum of Natural History in New York City. On July 3, 1898, Lieutenant Peary again sailed in the "Hope" from St. John's, Newfoundland, to Sidney, Cape Breton, and from there to Cape York, Baffin's Bay. At that place the party and stores were transferred to the "Windward." In the party with Peary were Dr. T. F. Diedrich, Jr., of New Jersey, Mathew Henson, his colored servant, and Shakapsi, an Eskimo. They carried provisions for four years. In September, 1901, word was received from Peary that he had rounded the Greenland archipelago (the extreme N. land known), and reached lat. 83° 50′ N. His final expedition in the ship "Roosevelt" left New York in July, 1908. He left his winter base at Cape Sheridan in February, and reached the Pole April 6, 1909, with one of his crew and four Eskimos.

THE "ROOSEVELT"

In 1911 Peary received the thanks of Congress and was promoted to the rank of Rear-Admiral. Many of the principal scientific and geographical societies of Great Britain and the Continent awarded medals to Admiral Peary for his discoveries. He died in 1920.

PEASANTS' WAR, a struggle called the "Bundschuhe," which broke out in 1502, and another, the War of Poor Conrad, in Württemberg, in 1514. The peasants of the small towns rebelled in Swabia, and those of the Thurgau rose in arms in June, 1524. After a temporary lull it broke out again early in 1525, on a more extended scale, the peasants of Alsace, Franconia, Lorraine, the Palatinate, and Swabia joining in the movement. The insurgents were defeated by the army of the Archduke Ferdinand, May 2; again at Königshofen, June 2; and were put down after 100,000 persons had perished, in June, 1525. The Anabaptists took part in the movement.

PEAT, a deposit formed in bogs by the decay of vegetable matter, frequently consisting almost entirely of sphagnum, or bog moss. In composition it differs from coal only in the relative proportion of its constituents. It forms extensive deposits in various parts of northern Europe, and notably in parts of Ireland, where it is commonly known as turf.

PEATTIE, ELIA WILKINSON, an American writer, born at Kalamazoo, Mich., in 1862. In 1883 she married Robert Burns Peattie. For many years she was a reporter and writer on Chicago papers and contributed articles to many magazines. She was the author of "The Beleaguered Forest," (1901); "The Edge of Things," (1904); "The Newcomers," (1916).

PEBA, *Dasypus* (*Tatusia*) *peba*, called also the black tatou, an armadillo ranging from Texas S. to Paraguay. The ears are large, long, and close together; the head small, long, and straight; mouth large. Scales hexagonal;

the bands vary in number, increasing with the age of the animal. It is nocturnal, swift of foot, and a good burrower. Its flesh is said to resemble sucking pig in flavor.

PEBBLE, or **PEBBLESTONE**, a name given to roundish nodules and geodes, especially of siliceous minerals, such as rock crystal, agate, etc.; but commonly and more correctly applied to small fragments of rocks and minerals which have become rounded and water worn, like the shingle forming the beach on a seashore. Thus, pebbles may be composed of any rock or mineral. Pebbles of gold are known by the name of nuggets or pepitas. The term pebble, among opticians, generally means the transparent and colorless rock crystal or quartz (pure silica) which is used as a substitute for glass in spectacles.

PECAN, or **PECAN NUT**, a species of hickory (*Carya olivæformis*) and its fruit, growing in North America. It is a large tree, with hard, very tough wood, pinnate leaves, and catkins of small flowers. The nut has a thin yellowish-brown shell, and is of a sweet and agreeable flavor. Pecan nut oil is used as a substitute for olive oil.

PECCARY, the popular name for two species of small suilline mammals from the New World, so nearly allied that they breed freely in captivity, but never produce more than two at a birth. The collared peccary (*Dicotyles torquatus*)

PECCARY

ranges from Arkansas S. to the Rio Negro, and seldom attacks other animals. The white-lipped peccary (*D. labiatus*) is rarely met with N. of British Honduras or S. of Paraguay. It associates in large droves, is very pugnacious, and does not hesitate to attack man. Both are omnivorous, and possess a gland in the middle of the back, secreting a musky substance, which taints the meat if not speedily removed after death.

PECHILI, GULF OF, a land-locked extension of the Yellow Sea, between the base of the Korean peninsula and the Chinese province of Shan-tung, into which the Pei-ho discharges.

PECK, a dry measure of two gallons, or eight quarts, for grain, pulse, etc.; the fourth part of a bushel. So, a great deal, number, or quantity.

PECK, ANNIE SMITH, an American mountain climber, born in Providence, R. I. She graduated from the University of Michigan in 1878. She studied archæology in Athens and for several years taught in preparation schools. She was also professor of Latin in Purdue University and of Smith College. In 1895 she climbed the Matterhorn and several other difficult peaks in Europe. She also climbed several of the highest mountains in Central and South America. She made explorations in Peru and climbed the highest peak of the Raura Range. In 1908 she succeeded in ascending Mt. Huascaran, Peru, the highest point in America yet attained by any American. She also climbed several other mountains in Peru which have never before been ascended. She is a prolific writer and her works include "A Search for the Apex of America" (1911); "The South American Tour" (1914). She has received many medals from foreign countries and is a member of the Royal Geographic Society.

PECKHAM, RUFUS WILLIAM, an American lawyer. He was born at Albany, N. Y., in 1838, and was admitted to the bar in 1859, serving for three years as district attorney of Albany co. After a varied career as lawyer, he became in 1883 associate judge of the State Supreme Court, and, from 1886, of the Court of Appeals in New York, and finally, in 1895, of the United States Supreme Court. His judgments in the Addystton Pipe and other cases riveted national attention. He died in 1909.

PECKHAM, RUFUS WILLIAM, an English statesman; youngest son of Sir Robert Peel; born in 1829. He was educated at Eton and Oxford; entered Parliament as member for Warwick and Leamington in 1865; was parliamentary secretary to the Poor-law Board (1868–1871); secretary to the Board of Trade (1871–1873); patronage secretary to the treasury (1873–1874); under-secretary for the Home Department (1880); and on the retirement of Sir Henry Brand (Viscount Hampden) in 1884, became speaker of the House of Commons. He was created 1st Viscount Peel in 1895. He died in 1912.

PECOS RIVER, a river of New Mexico and Texas, which has a S. E. course

of about 800 miles, and falls into the Rio Grande del Norte, but in summer is generally dry.

PEDAGOGUE, in classical antiquity, a slave who led his master's children to school, places of amusement, etc., till they became old enough to take care of themselves. In many cases the pedagogues acted also as teachers. A teacher of young children; a schoolmaster. (Used generally in contempt or ridicule.)

PEDAGOGY. Pedagogy is the art and science of teaching. Derived from two Greek words which mean the leading or the guiding of a boy, the term has come to represent the methods of the education of youth. It refers primarily, however, to training the teacher in the methods of education. Its point of application is rather the teacher than the student. Without reference to the content of instruction, pedagogy stands for the giving of training in the ways and measures which the teacher should use in the practice of his art. It does not primarily refer to the personality of the teacher, great as this value is in the securing of best educational results, nor to the content of instruction.

The history of pedagogy, in its origin and first years, belongs largely to the history of the normal schools of the United States. These schools have an American history of nearly one hundred years. The State of Massachusetts established three such schools, in 1839 and 1840, at Lexington, Barre, and Bridgewater. Pennsylvania established one school in Philadelphia in 1840, Connecticut one in New Britain in 1849, and Michigan one in Ypsilanti in 1850.

Though normal schools have usually been the chief schools of pedagogy, yet many universities have established courses or departments. New York University (under a different institutional name) established such a course as early as 1832. But it was not until the last years of the last century that such foundations in universities became common. The cause or condition, lying behind the foundation, was the progress of mental science or psychology. The better understanding of the mind of the child and of the adult resulted in the conviction that the teacher should, in turn, have a better understanding of the methods of approach to that mind and of the ways and means for its effective instruction. It was perceived that the mind is not an empty pail to be filled by the regular, or irregular, pumping of the teacher from the wells of knowledge. It was perceived that the mind was not a dray-horse, slow moving, lazy, antagonistic, to be beaten into obedience. It was seen that the mind is a force, or organism, to be quickened into its own subjective activities. It was made evident that the teacher's function is to draw out the native power of the pupils, to discipline that power unto an alert and comprehensive service. It was also made clear that in pedagogy the student and the teacher are to co-operate. Useless is each without the other.

The science and the art of pedagogy, for many years, suffered from the lack of appreciation among college teachers and officers. It still thus suffers. Not a few professors believe that the content of instruction is the chief element to be considered in education. They also believe that, when the proposed teacher has secured a sufficient amount of knowledge of his subject, he will also be found to possess a proper attitude for conveying this knowledge to the mind of the pupil. The falseness of this interpretation does not prevent its prevalence among some college teachers. The simple truth is that the profession of pedagogical training of the teacher has come to be recognized among educational interpreters of every grade as possessing an importance quite as great as that belonging to the professional training of the lawyer, or of the doctor, or of the clergyman. Most leading universities, therefore, have departments, or chairs, of pedagogy. The courses in these departments are elected by the great majority of students who propose to become teachers. In fact, in many States a certain amount of training is required of all teachers as a preliminary condition to the granting of a certificate by the official educational departments of the commonwealth.

In the larger interpretation of the art and science of pedagogy are found the names of several great educators. Such a list should include, at the beginning, the name of Horace Mann. For his service in Massachusetts and in Ohio helped to dignify the profession of the teacher and to quicken the people, not only of Massachusetts, but of every commonwealth, unto the tremendous significance of the teacher's work. In the generations following the death of Mann, in 1859, great progress was made in the pedagogical science—and great names are to be added to its promoters. Among them are Francis W. Parker, first of Quincy, Mass., and then of Chicago; G. Stanley Hall, of Clark University, Worcester; John Dewey and Edward L. Thorndike, of Teachers College, Columbia University; Edward B. Titchener, of Cornell University; and in cer-

tain ways, most significant, William James, of Harvard. The name of William T. Harris, Superintendent of the Schools of St. Louis, and later National Commissioner of Education, for general philosophical reasons, and somewhat for particular services, is also illustrious in this field. His writings formed a quickening influence for all teachers.

The term pedagogy is, at the present time, less commonly used than formerly. The term "Educational" or "Experimental Pedagogy," or "Teachers' Training Courses," or "Experimental Psychology" are employed as substitutes.

In the universities, and in certain normal schools, the department of pedagogy is recognized by the giving of a degree on the completion of the regular course. This degree is usually Bachelor of Pedagogy.

PEDAL, a projecting piece of metal or wood, which is to be acted upon or pressed down with the foot; a treadle; as, the pedal of a bicycle. In musical instruments, a part acted on by the feet. Also, a fixed or stationary bass; a pedal bass, pedal note, or pedal point, over which various harmonies or contrapuntal devices are constructed; they chiefly occur in fugues.

PEDEE, GREAT, or YADKIN, a river rising in Caldwell co., N. C., and flowing a general N. E. course to Stokes county, turns to the S. E., and following this direction rather tortuously, receiving several small tributaries on its way, it enters South Carolina, and takes the name of Great Pedee. Thence S. S. E. through this State, it enters the Atlantic Ocean by Winyaw Bay in Georgetown district. LITTLE PEDEE rises in Richmond co., N. C., and flowing S. by E. into South Carolina, enters the main stream from Horry county.

PEDRO I., DOM ANTONIO JOSÉ D'ALCANTARA, Emperor of Brazil, eldest son of John VI., King of Portugal, elder brother of Don Miguel, and nephew to Ferdinand VII., King of Spain; born in 1798, and was taken, in 1808, with the rest of the royal family, to Brazil. In 1822, the Brazilians having proclaimed their independence, chose Pedro for their emperor. The death of John VI., in 1826, left Dom Pedro the crown of Portugal; he soon afterward established a liberal government in that country, and granted it a charter. After abdicating the crown of Portugal in favor of his daughter, Donna Maria, he nominated his brother, Don Miguel, regent; but scarcely had he quitted Portugal, than Don Miguel took possession of the throne. In 1831 he was compelled to abdicate the throne of Brazil in favor of his son, Dom Pedro II. Returning to Europe, he raised troops in France and England, with which he, in 1833, drove Don Miguel from the throne of Portugal, and placed

DOM PEDRO I. OF BRAZIL

the crown upon the head of his daughter. He was twice married; his first wife being Maria Leopoldina, Archduchess of Austria, and the second, Amelia, daughter of Prince Eugène de Beauharnais. He died in 1834.

PEDRO II., Emperor of Brazil; born in Rio Janeiro, in 1825; succeeded to the throne on the abdication of his father, Dom Pedro I., in 1831; and married the Princess Theresa Christina Maria (died 1890), sister of Francis I., King of Naples, in 1843. Brazil prospered greatly under the rule of Pedro II., who did much to develop its resources in every direction. In 1871 he issued an imperial decree for the gradual abolition of slavery, which totally ceased in Brazil in May, 1888. He made several visits to Europe; assisted President Grant in opening the Centennial Exposition in Philadelphia in 1876; and was deposed by the revolution of November, 1889. He died in 1891.

PEDRO V., King of Portugal; born in 1837, was the son of Donna Maria II. and Fernando of Saxe-Coburg-Gotha, king-consort. He ascended the throne in 1855, and died in 1861.

PEDRO THE CRUEL, King of Castile and Leon; born in 1334. He succeeded his father, Alfonso XI., in 1350, and in 1353 married Blanche de Bourbon, sister of the King of France, but in

three days deserted her, and devoted himself to his mistress, Donna Maria Padilla. Subsquently he poisoned his queen, and cruelly persecuted members of his own family and Castilian grandees, till an insurrection was raised against him under the lead of Harry of Trastamara, who finally defeated and slew him in the battle of Montiel, March 14, 1369.

PEEBLESSHIRE, a county of Scotland, in the S. E., with ranges of hills, and traversed by the River Tweed, which empties itself into the North Sea. There are many villages, but no large towns. Manufactures include tweeds, and there is dairy farming, with ordinary agricultural products like wheat, potatoes and green crops. Capital, Peeble. Pop. about 16,000.

PEEKSKILL, a village in Westchester co., N. Y.; on the Hudson river, and on the New York Central and Hudson River railroad; 42 miles N. of New York. It is noted for the picturesque mountain scenery which surrounds it. The town contains a military academy, St. Gabriel's School, Helping Hand Hospital, Field Library, the New York State Military Camp, House of Good Shepherd, waterworks, gas, and electric lights, and several weekly newspapers. It has manufactories of fire brick, stoves, foundry facings, underwear, and hats. Pop. (1910) 15,245; (1920) 15,868.

PEEL, SIR ROBERT, an English statesman, son of Sir Robert Peel, a wealthy manufacturer; born in 1788, and studied at Harrow and Oxford. When just 21 years of age he entered Parliament. He was no orator, nor was he, properly speaking, a natural and simple debater. His manner was the artificial one of thorough training, and the House from his practice got to like it. In 1811 he was made under-secretary for the colonies, and in 1812, when only 24, he received the very responsible appointment of chief secretary for Ireland. After carrying his celebrated currency measure of 1819, he became, in 1822, home secretary. Refusing to take office under Canning, he joined the ministry of the Duke of Wellington in 1828. Here, by conceding Catholic emancipation (against which he had previously protested), he did one of those acts which have been called tergiversation by some. He still, however, professed to belong to the Conservative party, and he became a strenuous opponent of Earl Grey's ministry, and the Reform Bill. When a Conservative government was established in 1834, he gallantly undertook the attempt to work it, though conscious that the task was hopeless. He became prime minister in 1841. The position was that of the head of a protectionist government, established to defeat and suppress the free trade party. As circumstances developed from 1841 to 1846, it was seen that the prime minister, becoming convinced of the truth of free trade, was determined to carry its principles into practice. After the repeal of the Corn Laws and other measures in the same spirit, he resigned office in 1846. He died in 1850.

SIR ROBERT PEEL

PEELE, JOHN THOMAS, an American artist; born in Petersborough, England, in 1822; settled in New York City in 1835; early manifested a genius for portrait painting and went to Europe to study; returned to New York in 1846, and studied in the National Academy of Design, of which he became an Associate. Later, he devoted himself to genre painting, becoming a specialist in studies of child life. His chief productions include "Children in the Wood" (1847); the "Girl and Kitten"; "Sunny Days of Childhood"; "Jennie's Pet"; "Music of the Reeds"; "Grandma's First Lesson in Knitting"; "Asleep on Duty"; "The Wealth of Wild Flowers"; "The Little Laundress"; "Recitation for

Grandpa"; "The Bird's Nest" (1885); etc. He died in 1897.

PEER, in general, an equal, one of the same rank and station. In this sense it is used by the common law of England, which declares that every person is to be tried by his peers. Peer also signifies in Great Britain a member of one of the five degrees of nobility that constitute the "peerage" (duke, marquis, earl, viscount, baron), or more strictly a member of the House of Lords. The dignity and privileges of peers originated with the growth of the feudal system, the peers being originally the chief vassals holding fiefs directly from the crown, and having, in virtue of their position, the hereditary right of acting as royal counsellors. Subsequently not all the crown vassals appeared at court as advisers of the king, but only those who were summoned to appear by writ. This custom grew at length into a rule, and these summonses were considered proofs of hereditary peerage. Latterly the honor of the peerage has been exclusively conferred by patent. As regards their privileges all peers are on a perfect equality. The chief privileges are those of a seat in the House of Lords, of a trial by persons of noble birth in case of indictments for treason and felony, and misprision thereof, and of exemption from arrest in civil cases. The British peerage collectively consist of peers of England, of Scotland, of Great Britain, of Ireland, and of the United Kingdom, but only a portion of the Scotch and Irish peers are peers of Parliament.

PEGASUS, in astronomy, the Flying Horse; one of the 20 ancient N. constellations, bounded on the N. by Lacerta and Andromeda, on the S. by Aquarius, on the E. by Pisces, and on the W. by Equuleus and Delphinus. It is on the meridian in September at midnight. Alpha Pegasi is Markab, Beta Pegasi is Scheat, and Gamma Pegasi is Algenib. These with Alpha Andromedæ constitute the great square of Pegasus. In classical mythology, a winged steed which sprang forth from the neck of Medusa after her head had been severed by Perseus. As soon as he was born he flew upward, and fixed his abode on Mount Helicon, where, with a blow of his hoofs he produced the fountain Hippocrene. In ichthyology, the only genus of the family *Pegasidæ*. Pectoral fins broad, horizontal, long, composed of simple rays, sometimes spinous. Upper part of the snout produced. Four species are known; all very small fishes.

PEGOUD, ADOLPHE, a French aviator. He was born in 1885, and following the first success of Santos-Dumont and the Wright brothers in flying, took up the profession of an aeronaut. In 1913 he astonished Paris by his feats in the air, diving, looping the loop, flying with his machine at what had hitherto been considered impossible angles. During the war his machine was repeatedly hit by enemy bullets, but he succeeded in bringing down seven or eight German machines, winning military medals. He was killed in the summer of 1915.

PEGU, a town, division, and river of Lower Burma. The town stands on the river Pegu, 46 miles N. E. of Rangoon. The old city was founded in 573 and was made the capital of a powerful independent kingdom. European travelers in the 16th century speak of its great size and magnificence. It was destroyed in the middle of the 18th century by Alompra; but was rebuilt. It was offered to the British by the inhabitants, in the first and in the second Burmese War.

PEG WOFFINGTON. See WOFFINGTON, MARGARET.

PEHLEVI, PEHLAVI, or PAHLAVI, a Parsee sacred language, which succeeded the Zend and preceded the modern Persian. It was a development of the old Zend. The Zend Avesta was translated into it.

PEI-HO, a river of China, rises near the borders of Mongolia, flows N. E. and S. E., past Peking and Tien-tsin, and falls into the Gulf of Pechili after a course of more than 350 miles. The mouth of the river is defended by the powerful forts of Taku. See CHINA.

PEINE FORTE ET DURE, in Old English law, a penalty or punishment inflicted on those who, being charged with felony, remained mute, and refused to plead. It was introduced by a statute of Edward I., and was vulgarly called pressing to death, whence there was in Newgate a place called the press yard, where such penalty was inflicted.

PEIRCE, BENJAMIN, an American mathematician; born in Salem, Mass., April 4, 1809; studied at Harvard, where in 1833 he became professor. In 1849, he became consulting astronomer to the "American Nautical Almanac"; and from 1867 to 1874 he was superintendent of the Coast Survey. In 1836–1846 he issued an admirable series of mathematical text-books, and he contributed to various mathematical journals. His paper on the discovery of Neptune (1848) attracted universal attention; and his

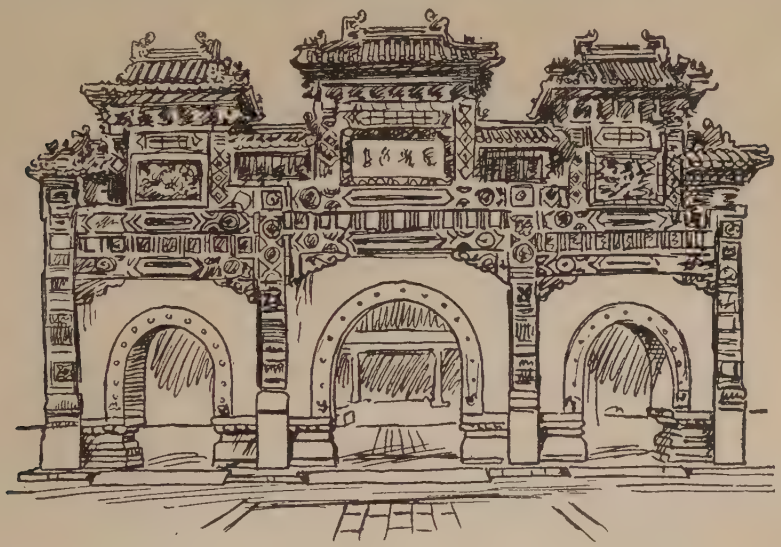
papers on the constitution of Saturn's rings (1851–1855) were equally remarkable. His great "Treatise on Analytic Mechanics" appeared in 1857; and he left his mark on various departments of mathematical and astronomical investigation. He died in Cambridge, Mass., Oct. 6, 1880.

PEIXOTTO, ERNEST CLIFFORD, American artist; born in San Francisco, Cal., in 1869. Studied art in Paris and exhibited at the Paris Salons and in many leading American exhibitions. From 1897 his chief work was that of illustrator. He lived for many years in Europe, where he wrote and illustrated articles for Scribner's and other magazines. He was an associate of the National Academy and a member of the National Society of Mural Painters.

PEKAN, *Mustela pennanti,* Pennant's marten, a North American species, larger than those found in Great Britain, being about four feet long, including the tail. Its face is dog-like; fur brown, with white patches on chest and belly. Its favorite food is said to be the Canadian porcupine (*Erythizon dorsatus*), but it often steals the fish used to bait traps, whence it is sometimes called the fisher.

PEKIN, a city of Illinois, the county-seat of Tazewell co. It is on the Illinois river, and on the Cleveland, Cincinnati, Chicago, and St. Louis, the Chicago and Alton, the Illinois Central, and other railroads. Its industries include the manufacture of agricultural implements, wagons, carriages, brick and tile, foundry products, etc. It is the center of an important coal producing and agricultural region and has a considerable grain market. It has an important shipping trade by rail and water. Its public buildings include a library, a court house, government buildings, and public school buildings. Pop. (1910) 9,897; (1920) 12,086.

PEKING, or **PEKIN,** the capital of the Chinese republic, province of Chih-le, or Pechili, in a vast sandy plain, between the Pei-ho and its important affluent, the Hoang-ho, 562 miles N. W. of



GATEWAY OF THE HALL OF CLOSSUS, PEKING

Nankin, and 100 miles W. N. W. of the Gulf of Pechili, in the Yellow Sea. It consists of two contiguous cities, each separately surrounded by walls, and together entered by 16 gates. The entire circumference is 25 miles. The northern city, which is nearly a perfect square (called Nei-tching, or the inner city, and sometimes the "Imperial" and "Tartar City"), consists of three inclosures. The inner inclosure, or "forbidden city," surrounded by walls of yellow tiles, 2 miles in circumference, hence called the "Yellow Wall," contains the palaces of the former emperor and empress. The southern city, called the Wai-ching, or "outer city," is also square, and occupied by the Chinese, and is both the seat of business and the residence of most of the population. The wall is 30 feet high, 25 feet thick at the base, and 12 feet at

the top. That of the imperial city is 40 feet high. The principal streets are very wide and regular, running between opposite gates. These are mostly filled with shops, extravagantly gilded and ornamented with blue and gold, flags, etc. The houses are generally one story high, and built of brick. Of the ornamental buildings, the most conspicuous are those commonly called triumphal arches. They consist of a large central gateway, with small ones on each side, all covered with narrow roofs, and like the houses are splendidly gilded, varnished, and painted. Besides these, there are numerous pagodas, a beautiful mosque, Greek church, and convent. Peking is the seat of government and is not distinguished by any peculiar manufacture; nor has it any foreign commerce or trade other than that directed to the supply of its own wants. This, however, is necessarily very considerable. The country round the city being sandy and poor, a large portion of its supplies are brought from a distance—partly from the sea by the Pei-ho, but principally by the Grand canal and the Eu-ho, which connect it with Nankin and most of the E. provinces. The early history of Peking is involved in obscurity. It was besieged and taken by the Mongols, led by Zinghis Khan. Kublai Khan rebuilt it, and made it his capital in 1260. The Mongol dynasty, founded by Kublai Khan, continued to occupy this city till it was expelled from China, in 1367. In 1421, the third emperor of the Chinese dynasty of Ming transferred his residence thither from Nankin, since which it has been the capital. It surrendered to the allied armies of France and England in 1860, on which occasion the Yueng-ming, or summer palace of the emperor, situated in the vicinity of the city, was destroyed. During the "Boxer" uprising of 1900 the various foreigners in Peking were besieged in the English legation. For weeks they were given up as lost, but they managed to hold out till the arrival of the foreign troops. See BOXERS; CHINA. Pop. about 2,000,000.

PELAGIANS, a sect of heretics that arose in the Church about the beginning of the 5th century. Their founder was Pelagius, a monk, a native of Britain, whose original name was Morgan. He was greatly scandalized by the gross sensualities and immoralities that prevailed in the Church, and was of opinion that they arose from a belief in the efficacy of the sacraments and the sufficiency of faith. The remedy for all, he thought, would be a creed holding man's salvation to be dependent on his own exertions. Pelagius went to Rome, and afterward to Carthage, where he was condemned by a council as holding the following heresies: (1) That Adam was by nature mortal, and would have died whether he had sinned or not; (2) that the consequences of Adam's sin were confined to himself, and did not affect the human race; (3) that new-born infants are in the same condition as Adam was before his fall; (4) that the law qualified man for heaven, as well as the Gospel; and that before Christ some men had lived without sin; (5) that a man may keep the commandments of God without difficulty, and preserve himself in a state of perfect innocence; and that the grace of God is given in proportion to our merits. These are the chief errors which are generally reckoned under the name of Pelagianism. Augustine and Pope Innocent I., in 417, anathemized the rising heresy. His successor, Zosimus, also condemned the obnoxious doctrine, and the emperor promulgated decrees of confiscation and banishment against them. Pelagius retired into exile, where he died. The ninth article of the English Church is directed against the Pelagian error respecting original sin.

PELAGIC SEALING, the taking of seal in the open sea. By the Paris award of 1893, pelagic sealing within a zone of 60 miles off the Pribilof islands was forbidden. See BERING SEA.

PELAGIUS, the author of the system of doctrine which goes by his name. See PELAGIANS.

PELAGIUS, Pope; a native of Rome; ascended the papal chair in succession to Virgilius, in 555. He endeavored to reform the clergy; and when Rome was besieged by the Goths, he obtained from Totila, their general, many concessions in favor of the citizens. He died in 560.

PELAGIUS, II., Pope; ascended the papal chair, in succession to Benedict I., in 587. He opposed John, Patriarch of Constantinople, who had assumed the title of œcumenic or universal bishop. He died of the plague in 590.

PELARGONIC ACID. Nononic Acid. $CH_3(CH_2)_7COOH$. Contained in the oil from *Pelargonium roseum*, melting point 12.5° C., boiling point 253° C.; specific gravity 0.907. The peculiar odor of the quince is stated to be due to the presence of ethyl pelargonate. It may be prepared artificially by oxidizing oil of rue.

PELARGONIUM, a large genus of *Geraniaceæ*, divided into about 15 sub-

genera. Most of the species are from the Cape of Good Hope, one is from the Canary Islands, one from Asia Minor, and a few from Australia. Extensively cultivated in England in flower pots in houses, in greenhouses, and in the open air. The genus readily forms hybrids, which most of the cultivated species are. They are popularly called geranium.

PELASGIAN, one of an ancient and widely diffused prehistoric tribe which was the common parent of the Greeks and of the earliest civilized inhabitants of Italy. Most authors agree in representing Arcadia as one of their principal seats. The term Pelasgi was used by the classic poets for the Greeks in general.

PELÉE, MONT, an active volcano on the island of Martinique in the French West Indies. Although previously known to be in action, it had not caused much destruction until 1902, when by its eruption it destroyed the city of St. Pierre with its 30,000 people. This occurred on May 8, 1902, and was accompanied by extraordinary electrical disturbances which were recorded at the antipodal region of the earth in less than two minutes' time. On August 30 of the same year the volcano, by another eruption, caused a loss of life estimated at 2,500 people in the villages situated on the neighboring islands.

PELEUS, in mythology, a King of Thessaly. He married Thetis, one of the Nereids, the only one among mortals who married an immortal. Being accessory to the death of his brother Phocus, he retired to the court of Eurytus, who reigned at Phthia. He was purified of his murder by Eurytus, who gave him his daughter Antigone in marriage. Peleus subsequently killed Eurytus by accident, while in the chase of the Calydonian boar. This event obliged him to retire to Iolchos, when the wife of Acastus, king of the country, brought certain charges against him, which caused him to be tied to a tree on Mount Pelion, that he might become the prey of wild beasts; but Jupiter, aware of the innocence of Peleus, ordered Vulcan to set him at liberty. Peleus revenged himself on Acastus, by driving him from his possessions and putting to death his wife. After the death of Antigone, Peleus fell in love with Thetis, who rejected his suit because he was a mortal. Having offered a sacrifice to the gods, Proteus at length informed him that to obtain Thetis he must surprise her asleep in her grotto, near the shores of Thessaly. This advice was followed; and Thetis, unable to escape from the grasp of Peleus, at last consented to marry him. Their nuptials were celebrated with the greatest solemnity by all the gods but the goddess of discord, who was absent. From the marriage of Peleus and Thetis was born Achilles. The death of Achilles was the source of so much grief to Peleus, that Thetis promised him immortality, and commanded him to retire to the grottos of the island of Leuce, where he would see and converse with the manes of his son.

PELEW ISLANDS, or **PALAU**, a group in the Pacific formerly belonging to Spain, lying S. E. of the Philippines, at the W. extremity of the Caroline Archipelago, with which they are sometimes classed. There are about 200 islands, mountainous, wooded, and surrounded with coral reefs. Total area, 170 square miles. The principal is Babelthouap or Babeltop. The soil is rich and fertile, and the climate healthy. Bread fruit, cocoanuts, sugar cane, palms, areca nuts, yams, etc., are grown. Turtles, trepang, and fish abound on the coasts. The men go entirely naked and the women nearly so. The islands were discovered by the Spaniards in 1543, and visited again in 1696. In 1899 Spain sold this group, with the Carolines and all of the Ladrones excepting Guam, to Germany.

PELIAS, in Greek mythology, son of Neptune, and King of Iolchus. The legends ascribe to him the Argonautic expedition, for he wished to be rid of Jason. Medea bade his daughters cut him in pieces and boil him, to make him young again, but he died while undergoing the process.

PELICAN, any bird of the genus *Pelecanus*, and especially the common pelican, the onocrotalos of the Greeks and Romans, and the *Pelecanus onocrotalus* of modern science. Pelicans are large piscivorous water fowl, with an enormous pouch capable of being contracted when not in use as a depository for food. The species are widely distributed, and frequent the shores of the sea, rivers, and lakes, feeding chiefly on fish, which they hunt in shallow water, the pelican of the United States (*P. fuscus*) being the only species which dives for its prey. The common pelican is about the size of a swan, though its enormous bill and loose plumage make it look considerably larger; it is white, slightly tinged with flesh color, and the breast feathers become yellow in old birds. It usually nests on the ground, in some retired spot near the water, and lays two or three

white eggs. The pelican sits during the night with its bill resting on its breast; and, as the hook at the extremity of the bill is red, this may have given rise to the legend that the bird feeds its young with blood from its own breast.

In chemistry, an alembic with a tubu-

PELICAN

lated capital, from which two opposite and crooked beaks passed out, entering again at the belly of the cucurbit. In dental surgery, an instrument for extracting teeth, curved at the end like the beak of a pelican. In art, the pelican is the symbol of charity. It is generally represented wounding its breast to feed its young with its own blood—a tale told in the fabulous natural history of the Middle Ages, and which made the bird the adopted symbol of the Redeemer.

PELION, in ancient geography, the name of a wooded mountain range in Thessaly, extending along the E. coast. Its E. side descends in steep and rugged precipices to the sea. Further to the N., near the mouth of the Peneus, is the steep conical peaks of Ossa, which according to the classic myth, the Titans placed on the summit of Pelion in order to scale Olympus, the abode of the gods. The modern name is Zagorá.

PELLA, the ancient capital of Macedonia, and the birthplace of Philip II. and Alexander the Great; situated in the midst of marshes, a few miles N. W. of Thessalonica, which stood half way between it and the head of what is now the Gulf of Saloniki. Its royal castle had wall paintings by Zeuxis.

PELLAGRA, a chronic disease occurring in many parts of the world, including the southern portions of the United States. Its cause is not certainly determined. For a long time it was thought to be due to the eating of damaged maize (corn). More recently Sambon claims to have discovered a protozoal organism responsible for the pellagra symptoms which is transmitted by a small fly *Simulium replans*. The symptoms of pellagra are sore mouth, gastric and intestinal disturbance, a skin eruption in summer which disappears on the approach of cold weather and returns in the following spring; when the disease has lasted for four or five years the skin becomes atrophied, wrinkled, and inelastic; walking is difficult, the victim tending to fall either forward or backward. The patient's face has a characteristic expression of anxiety. Insomnia is present, with great mental depression, and either moroseness or irritability. Various forms of paralysis eventually develop. The disease may last from ten to fifteen years.

Treatment. Arsenic in some form, such as atoxyl (see SLEEPING SICKNESS), is the best remedy.

PELLICO, SILVIO, an Italian patriot; born in Saluzza, in Piedmont, in 1789. In early life he gained considerable distinction as a writer for the stage; and his tragedy, "Francesca da Rimini," may

SILVIO PELLICO

still be read with interest. In 1819 he became connected with the press, and in 1820, he was seized as a carbonaro by the Austrians at Milan, and confined in the fortress of Spielberg for 10 years. The volume on which his fame rests tells the story of his imprisonment. His

treatment was not distinguished by the most terrible hardships or tortures which other more illustrious persons have undergone, but it tells a tale of solitude, of patient endurance, and of pleasing sentiments. Released by the amnesty of 1830, he found shelter at Turin, and was employed as librarian in the house of the Marchesa Barolo till he died. His imprisonment had ruined his health, and he took no further part in politics. He died in 1854.

PELOPONNESUS, the ancient name of the Morea. Among its most important cities were Sparta in Laconia, and Argos the capital of Argolis. Sparta acquired, after the Messenian war, a decided supremacy over the other states, and disputed the supremacy with Athens in a war of almost 30 years' duration (431–404 B. C.)—the famous Peloponnesian War, of which the history has been written by Thucydides. After the Roman conquest, the Peloponnesus formed part of the province of Achaia, and subsequently belonged to the Byzantine empire.

PELOPS, in Greek mythology, the grand-son of Zeus, and the son of Tantalus, was slain by his father, and served up at an entertainment which he gave to the gods, in order to test their omniscience. They were not deceived, and would not touch the horrible food; but Demeter, absorbed with grief for the loss of her daughter, ate part of a shoulder without observing. The gods then commanded the members to be thrown into a cauldron, out of which Clotho brought the boy again alive, and the want of the shoulder was supplied by an ivory one. According to the legend, Pelops was a Phrygian, who, being driven by Ilos from Sipylos, came with great treasures to the peninsula which derived from him the name of Peloponnesus, married Hippodamia, obtained her father's kingdom by conquering him in a chariot race, and became the father of Atreus, Thyestes, and other sons.

PELVIS, the lower portion of the great abdominal cavity, bounded by the abdomen above, the perineum below, the peritoneum, muscles, and fascia in front, below, and at the side; and the sacral plexus of nerves and the sacrum behind. It contains the bladder, prostate gland, *vesiculæ seminales*, and rectum. It is composed of the two *ossa innominata*, the sacrum and the coccyx. There are marked differences in the male and female pelvis; that of the male is the stronger, with a deeper and much narrower cavity; that of the female is much shallower and more widely expanded.

PEMBA, a coral island off the E. coast of Africa, in British East Africa, Zanzibar Protectorate, 50 miles N. E. of Zanzibar Island; area, 372 square miles. There are numerous bays on the E. coast; on one of them stands the chief port, Chaka. Pop. (1917) 9,000. The trade is in cattle, rice, cloves, and ebony. It was transferred by the Sultan of Zanzibar to the British East African Company in 1891. Capital, Weti. Pop. (1917) 83,130.

PEMBERTON, a town in the county of Lancashire, England, two miles S. W. of Wigan. It has important manufactures, including cotton, chemicals and iron products. There are extensive coal mines and stone quarries in the vicinity. Pop. about 25,000.

PEMBERTON, MAX, an English novelist. He was born in 1863 in Birmingham, was educated at Cambridge, and in 1885 began writing for "Vanity Fair" and other journals. His first romance, "The Iron Pirate," appeared in 1893. Since then he has written: "Queen of the Jesters"; "The Garden of Swords"; "Féo"; "House Under the Sea"; "Beatrice of Venice"; "My Sword for Lafayette"; "The Show Girl"; "Captain Black"; "The Lady Evelyn"; and "Garrick" (a play).

PEMBROKE, the county-town of Pembrokeshire, Wales; on a navigable creek of Milford Haven, 114 miles W. by N. of Cardiff. On the extremity of the ridge on which the town is built stands Pembroke Castle, founded in 1904 by Arnulf de Montgomery, a very imposing ruin. The birthplace of Henry VII., this castle in 1648 was taken by Cromwell after a six weeks' siege. Monktown Priory, with its roofless decorated choir, is another interesting structure. Pembroke for more than four centuries has given the title of earl to the House of Herbert. At Pembroke Dock, or Pater, 2½ mile N. W., is the naval dockyard and arsenal, established in 1814. Pop. about 90,000.

PEMBROKE COLLEGE, one of the colleges included in Cambridge University, England. It was founded in 1347 by the widow of the earl of Pembroke. Henry VI. endowed the college with numerous gifts during the years 1440–1450. The college buildings are mostly of the 18th century, although they were almost entirely rebuilt in 1874. The foundation consists of a master, and thirteen fellows, and a number of scholarships, most of which have been established after the foundation. Many noted names in English history are associated with Pem-

broke College, among others Spenser and Thomas Gray, the poets. The famous English martyr bishop, Ridley, and the great English statesman, William Pitt, were among the alumni. The library of the college, consisting of about 20,000 volumes, contains many interesting and valuable works. In 1913-1914 there were 293 undergraduates.

PEMBROKE COLLEGE, a college at Oxford, England. Founded in 1624, when Thomas Tesdale bequeathed a sum of money for the support of scholars in Oxford. Richard Wightwick added to Tesdale's bequest, and because the latter had indicated Balliol as his preference, that college claimed the endowment. James I., however, determined to found a new college, and, with these two bequests, founded Pembroke, named after the then chancellor of the university. The buildings are very picturesquely situated and are, for the most part, of modern construction. The college consisted of a master, 7 fellowships, and about 150 undergraduates. During the war the number of undergraduates was reduced to a third of that figure. Among its famous alumni are John Pym, George Whitefield, Beaumont, the dramatist, and Samuel Johnson. Some memorials to Johnson have been erected, and a number of relics from his student life are there.

PEMBROKESHIRE, county of Wales, on W. coast, and Bristol Channel. Is mountainous, and traversed by River Leife; and Milford Haven is important harbor for commerce and war. Coal mines are numerous, and iron ore and lead are leading minerals. In the valleys the products are barley, wheat, and green crops. Pembroke, capital; St. Davids, seat of ancient episcopal see. Pop. 89,600.

PEMMICAN, or **PEMICAN**, meat cut in thin slices, divested of fat, and dried in the sun, then pounded into a paste, mixed with melted fat, and sometimes dried fruit, and pressed tightly into cakes or bags. It is an easily preserved food, will keep for a long time, and contains much nutriment in a small compass.

PEMPHIGUS, or **POMPHOLYX**, a skin disease which is characterized by an eruption of large vesicles, filled with serous fluid, and known as bullæ. The disease occurs both in acute and in the chronic form. In a mild case of acute pemphigus, bullæ, or blisters, from the size of a pea to that of a chestnut, appear in succession (chiefly on the extremities), and having continued three or four days break, form a thin scab, and soon heal, unaccompanied with febrile or inflammatory symptoms. In severe cases there is considerable constitutional disturbance, the bullæ are larger, and the scabs heal with difficulty. The chronic form differs mainly from the acute by its prolonged continuance. The acute variety chiefly affects children, and has been ascribed to dentition, errors of diet, etc.; while the chronic form chiefly attacks aged persons, and is probably due to debility and impaired nutrition.

PEN, an instrument for writing with a fluid. The metallic stilus for the production of incised letters was probably the earliest writing implement. It was used by the Romans for writing on tablets coated with wax; but both they and the Greeks also used what is the true ancient representative of the modern pen, namely, a hollow reed, as is yet common in eastern countries. It has been asserted that quills were used for writing as early as the 5th century A. D. In Europe they were long the only writing implements, the sorts generally used being those of the goose and swan. Up till the end of the first quarter of the 19th century these formed the principal material from which pens were made. In 1803 Wise produced steel pens of a barrel form, mounted in a bone case for carrying in the pocket. Joseph Gillott commenced the manufacture about 1820, and succeeded in making the pen of thinner and more elastic steel, giving it a higher temper and finish. Mr. Gillott was followed into the same field by Mr. Perry and others, and their improvements reduced the cost and raised the quality. Cast-steel of the finest quality is used in the manufacture, and the various operations are performed by cutting, stamping and embossing apparatus. Birmingham was the first home and is still the principal center of the steel-pen industry. Gold pens tipped with minute particles of iridium are now in extensive use, and a good one will last for years. Fountain pens and penholders, to carry a considerable supply of ink and to discharge it in an equal manner, were invented by Joseph Bramah.

PENAL LAWS, laws which prohibit an act, and impose a penalty for the commission of it.

PENAL SERVITUDE, a form of punishment in English criminal law, substituted, in 1853, for the punishment of transportation. It consists in imprisonment with hard labor for a term of years, from two up to the duration of life, in one of the penal establishments in Great

Britain, or in any of the British dominions beyond the seas.

PENANCE, in Roman theology and ritual: 1. The virtue which inclines the soul to detest sin for its own sake—that is, because it is an offense against God. 2. The outward acts by which sorrow for sin is evinced. 3. The satisfaction which a priest imposes on the penitent before giving absolution, often called sacramental penance. 4. A sacrament of the New Law, whereby sins, whether mortal or venial, committed after baptism, are forgiven. The Council of Trent defines that the form of the sacrament consists in the words, "Ego te absolvo," etc., the "quasi materia" in the acts of the penitent—contrition, confession and satisfaction. The minister of the sacrament is a priest with ordinary or delegated power to absolve, and the subjects those who have received baptism. It is not of obligation to confess venial sins, but mortal sins committed after baptism must be confessed.

PENANG, PULO-PENANG, or PRINCE OF WALES ISLAND, an island belonging to Great Britain, lying at the N. entrance of the Straits of Malacca, off the W. coast of the Malay Peninsula, from which it is separated by a channel 2 to 5 miles across; area, 107 square miles. Two-fifths of Penang is plain, and the rest hills, which rise to a height of 2,734 feet in the peak now used as a sanatorium. The climate is hot, but very healthy. The scenery is charming. The island produces cocoanuts and areca nuts, nutmegs and cloves, rice, sugar, coffee, and pepper. Georgetown, or Penang, the capital and port (Pop. 1915 about 105,000) has a large commerce. The harbor is the strait between island and mainland. Penang was made over by treaty to the East India Company in 1786 by the Rajah of Quedah, and with province Wellesley, a long strip of the Malay Peninsula opposite (area, 270 square miles), it forms one of the Straits Settlements, having a resident councillor to control administration. Pop. (1915) 294,858.

PENATES, the Roman gods of the storeroom and kitchen. The family hearth, which formerly stood in the atrium, and their altar, and on it their images, two in number, were placed, with the image of the Lar between them. These penates were represented dancing and elevating a drinking horn in token of joy and plenty. The calends, nones, and ides of each month were set apart for their worship, as were the caristia (Feb. 22) and the saturnalia. Each family had its own penates, and the state had its public penates. The worship of these gods was closely connected with that of Vesta, in whose temple the public penates were at one time worshipped, though they had a temple of their own near the Forum.

PENCIL, a name applied to instruments for writing, drawing, or painting, differing as much in their construction as in the use to which they are applied. There are now in use the following kinds of pencils: Hair pencils, black lead pencils, chalk pencils, and slate pencils. The first are used for painting or writing with fluid colors, either oil or water, and in China and Japan are employed almost entirely instead of pens for writing; the color used being the black or brown pigment obtained from various species of sepia or cuttle fish. The well-known black lead pencil is made by cutting black lead or plumbago. Some pencils are filled with colored chalk instead of black lead.

The ever-pointed pencil is an instrument for using cylindrical pieces of black lead, which are forced forward in the pencil just so far as to allow them to be used without breaking. The pencils for using liquid colors or paints are made of hog's bristles, camel's hair, fitch, sable, etc. Those of a large and common kind are described under BRUSH (*q. v.*). The soft pencils for artists are made as follows: The tail of the animal (sable, badger, marten, etc.) is scoured in a solution of alum; then steeped for several hours in lukewarm water; then dried in linen cloths; and finally combed out regularly. The hairs are seized with pincers, and cut off near the skin, and the little parcels of hair are sorted into groups according to their length. A few hairs are then taken—enough for one pencil—and placed in a little receptacle, which holds them while a thread is bound round near the roots. The base of the pencil is then trimmed flat by scissors. The hairs thus prepared are fitted either into quills or into tin tubes. The quills are those of swans, geese, ducks, lapwings, pigeons, or larks, according to the size of the pencil. Each quill is softened and swelled in hot water; and the bunch of hairs is introduced at the larger end, and pulled forward by a simple apparatus to the smaller end, where the shrinking of the quill binds the hairs closely. Women are generally more successful than men in preparing the small and delicate pencils. Slate pencils, for writing on slate, are made either by cutting slate into thin sticks, and rounding them, or by cutting it into fine square

slips, and incasing them in wood, as in the case of black lead, etc.

In optics, an aggregate or collection of rays of light which converge to, or diverge from, the same point.

PENDANT, in architecture (1) an ornament which is suspended from the roof of a Gothic or Tudor building; the hanging pendants of a vaulted ceiling, uniting solidity with ornament. There are some excellent samples in Henry VI.'s Chapel in Westminster Abbey, London. In vaulted roofs pendants are formed of stone, richly sculptured, and in timber work they are of wood carved. (2) A hanging keystone, the lower face of which projects beyond the intrados of the arch.

In art (in the plural), two pictures, statues, or groups of sculpture or engravings, which, from their similarity of subject, size, form, etc., can be placed together with due regard to symmetry. Nautically: (1) A strap or short rope depending from a mast-head, and having thimbles for bearing the blocks, which transmit the effects of tackles to distant points, etc. Used especially in setting up masts and rigging. (2) A pennant.

PENDLETON, a town of Oregon, the county-seat of Umatilla co. It is on the Umatilla river and on the Oregon Railroad and Navigation Company and the Washington and Columbia River railroads. It is the center and distributing point of an important wheat-growing and cattle-raising regions. Its industries include flour mills, woolen mills, machine shops, etc. Water power is supplied by the river, which is crossed by four bridges. The public buildings include a court house, a public library, a State hospital for the insane, and a Federal building. Pop. (1910) 4,460; (1920) 7,387.

PENDULUM, in mechanics, a simple pendulum is a heavy particle suspended by a fine thread from a fixed point, about which it oscillates without friction. The time of its vibration is directly as the square root of the length, and inversely as the square root of the accelerating force of gravity. The length of the arc through which it vibrates does not affect the result. No simple pendulum can exist; all constructed by man are compound pendulums in which there gravitates, not a particle, but a heavy body called the bob, the law of friction of course operating.

In horology, the ordinary pendulum is believed to have been the invention of Ebn Junius of the University of Cordova, about A. D. 1100, his companion, Gerbert (poisoned in 1102), making the first escapement. Henry de Wyck (1364), Harris (1641), and Huyghens (about 1657), applied it to clocks; Galilei, in 1581, having recommended a pendulous weight as a true measurer, and Sanitorius, in 1612, the combination of a pendulum with wheel work. Pendulums generally move in arcs of circles. In the cycloidal pendulum the rod of suspension describes the arc of a cycloid, and in the conical a cone. Heat lengthens, and cold contracts the rod of a pendulum, if it be of a single metal, as steel or iron. To neutralize these effects compensation pendulums are made; the gridiron pendulum having bars of iron and brass to work against each other, and the mercurial pendulum making the center of the oscillation of the bob uniform by the expansion and contraction of mercury inside. The curved line along which the bob of a pendulum moves is called the arc of vibration, the horizontal chord of that arc the axis of oscillation, and the point around which the pendulum moves the point of suspension, or the center of motion. The length of a pendulum vibrating seconds is directly proportionate to the force of gravity at the place. One constructed to beat seconds at London (lat. of Greenwich Observatory, 51° 28′ N.) at the sea-level must measure 39.13983 inches; at the equator, 39.02074 inches; and at Spitzbergen, 39.21469 inches.

PENELOPE, a celebrated Grecian princess, daughter of Icarius, wife of Ulysses (Odysseus), and mother of Telemachus. According to the Homeric legend, Ulysses, during his long wanderings after the fall of Troy, was generally regarded as dead, and Penelope was vexed by the urgent suits of many lovers, whom she put off on the pretext that she must first weave a shroud for Laertes, her aged father-in-law. To protract the time, she undid by night the portion of the web which she had woven by day. When the suitors had discovered this device, her position became more difficult than before; but fortunately Ulysses returned in time to rescue his chaste spouse from their distasteful importunities.

PENFIELD, EDWARD. American illustrator. He was born in New York in 1866, studying painting first in his native city; then in Holland and England. Returning to the United States he became art editor of "Harper's" in 1891, and designed many magazine covers, posters, calendars, and contributed the illustrations to many stories and articles. His larger decorative work in-

cludes ornamentations at the Rochester County Club, and in Randolph Hall, Cambridge, Mass. His illustrated works include: "Holland Sketches"; and "Spanish Sketches."

PENFIELD, FREDERIC COURTLAND. Author and diplomat. Born in Connecticut, 1855, and after completing

FREDERIC C. PENFIELD

his education in England and Germany, became in 1885 vice-consul general at London. He later served in Egypt as American consul-general, and in 1913 was appointed by President Wilson ambassador to Austria-Hungary. There he remained in charge of United States affairs until the severance of diplomatic relations in 1917. During the period of American neutrality (1914–1917) he took care of the interests in Austria-Hungary of several of the belligerents.

PENGUIN, a name first given to the great auk (*Alca impennis*), but now applied to any member of the family *Sphæniscidæ*. Penguins are aquatic birds confined to the high S. latitudes of both hemispheres, where they congregate in large flocks. The body is generally elliptical; neck of moderate length; head small; bill moderately long, straight, compressed; tail short. They have no quills in their wings, which are as rigid as the flippers of a cetacean, and utterly useless for flight, though they move freely at the shoulder-joint, forming most efficient paddles, and are usually worked alternately with a rotatory motion. They make no nests, and lay a single egg, which is tended by both birds, and the female takes charge of the young for nearly 12 months. The emperor penguin is *Aptenodytes patagonica*, and the king penguin *A. longirostris*. Their molting is very peculiar. The flipper-like wings cast off short scale-like feathers; they flake off like the shedding of the skin of a serpent.

In botany, the broad-leaved pineapple, *Bromelia pinguin*, of which penguin is a corruption. It is very common in Jamaica, where it is planted as a fence around pasture lands, on account of its prickly leaves. When stripped of their pulp, soaked in water, and beaten with a wooden mallet, they yield a fiber whence

PENGUIN

thread is made. The juice of the fruit in water makes a good cooling drink in fevers.

PENICILLIUM, in botany, a genus of hyphomycetous fungi. It consists of a dense, pasty crust, slimy below and above, consisting of minute pedicels, terminating in a pencil of moniliform spores. One, *P. glaucum*, is green mold.

PENINSULA, a piece of land almost surrounded with water, and connected to the mainland by a narrow strip of land or isthmus. With the definite article the term is specifically applied to Spain and Portugal.

PENINSULAR WAR, the war carried on in the beginning of the 19th century in Spain and Portugal by the British forces, aided by the native troops, against the French. Sir Arthur Wellesley, afterward the Duke of Wellington, landed with 10,000 British troops, at Figueras, in Portugal, Aug. 1–3, 1808, and on the 21st defeated the French at Vimiera. On August 30 the Convention of Cintra was signed, by which Junot agreed to evacuate the country. Wellesley returning home, the command of the army, now increased to 20,000 men, was given over to Sir John Moore, who was forced by Soult to fall back on Corunna, where a battle was fought on Jan. 16, 1809, in which the former lost his life. Wellesley again received command of the army, and, after a series of sanguinary but generally successful combats, drove the French across the Pyrénées, entering France on Oct. 7, 1813.

PENITENTIARY, a prison in which convicted offenders are confined and subjected to a course of discipline and instruction with a view to their reformation.

PENITENTIARY, one of the offices of the Roman Curia, taking special cognizance of matters relating to the confessional and dispensations from such impediments to marriage as are not diriment. The dignitary who presides over the office described above. He is a cardinal priest and must be a doctor of theology or canon law. That part of the church to which penitents are restricted. Canon penitentiary: In the Roman Church a canon appointed in compliance with a decree of the Council of Trent which directs that in every cathedral church, if possible, a penitentiary should be appointed. He must be 40 years of age, master of arts, a doctor, or a licentiate in theology or canon law. His duty is to deal with reserved cases, and his attendance in confessional is considered equivalent to presence in choir. A prison: a reformatory for criminals.

PENN, WILLIAM, founder of the State of Pennsylvania; son of Sir William Penn; born in London, Oct. 13, 1644. He received a good education, completing it at Christ Church, Oxford, but disappointed his father's expectations by turning Quaker, and was discarded by him. Sir William afterward relented, and sent his son abroad. Young Penn visited France and Italy, and returned to his native country in 1664. He spent two years in the study of law at Lincoln's Inn, and was then sent to Ireland to manage his father's estates; but, happening to hear a discourse at Cork, by Thomas Loe, a leading Quaker, he reverted to his former opinions, and traveled to propagate this new faith. He was taken up for preaching, and sent to prison; but was released through the interest of his father. After his return to England, he was sent to the Tower, on account of a book which he had written;

WILLIAM PENN

and, while there, he composed his principal work, entitled "No Cross, no Crown," intended to show the benefit of suffering. On his release, he resumed his former labors, and was apprehended, with some others, and tried for preaching at a conventicle in Gracechurch Street. The jury persisted in finding them not guilty, and were fined for acting contrary to the dictates of the judge. Admiral Penn was reconciled to his son before his death, and left him all his property. He continued firm in his attachment to the Society of Friends. In 1681 he obtained from the crown, in lieu of the arrears due his father, the grant of the province in North America, and it was Charles II. who, in honor of Penn, proposed the name Pennsylvania. The code of laws which Penn prepared for the province was exalted in aim, comprehensive in scope; yet, with slight exceptions, its details were marvelously practical. Accompanied by emigrants, Penn sailed from Deal Sept. 5, 1682, for America, and landed at New Castle, Del., Oct. 24, and at Upland, Pa., (now Chester), Oct. 29, 1682. The work of organization was rapid. A few

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PENNSYLVANIA

SCALE OF STATUTE MILES

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SCALE OF KILOMETERS

0 10 20 30 40 50 60 70 80

County Towns ⊙ Railroads ——— Canals ———

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Swedes and Dutch had previously settled in Pennsylvania, but colonists from various regions of the Old World now poured in. Universal toleration was proclaimed, a charter of liberties was solemnly consecrated, and a democratic government was established. In his dealings with the Indians and their chiefs, Penn manifested his accustomed magnanimity and justice. The capital city, Philadelphia, was planned on a scale commensurate with Pennsylvania's expected greatness. Penn's family was in England. Hearing that his wife was ill and that his friend Algernon Sidney had perished on the scaffold, he sailed for England. During the reign of James II. Penn was continually at court. James had been his father's friend, and he had always been glad and prompt to help Penn himself. The overthrow of James was in more than one respect a misfortune for Penn. In the spring of 1690 he was arrested on the charge of holding treasonable correspondence with the dethroned monarch. The absurdity of the charge being swiftly and glaringly evident Penn was set at liberty. Yet, though his conduct continued to be blameless, he was, by an order in council, stripped, March 14, 1692, of his title to the Pennsylvanian government—a tyrannical act involving his utter ruin; for, besides that he had risked his whole substance in the Pennsylvania experiment, his estates, both in England and in Ireland, had been grievously mismanaged by incompetent or dishonest overseers. An order in council capriciously restored to Penn, in 1694, the Pennsylvania government. But the ownership of territories so extensive was almost barren to him. His agents were faithless, and the colonists, though profuse in expressions of regard, were in reality ungrateful and grasping. A visit to his Irish estates preluded Penn's second expedition to the New World. His family went with him to America, though rather from necessity than choice. Penn's residence in the colony was more beneficial to the colonists than to himself. He branded as iniquitous negro slavery, and to the aged, the sick, and the destitute he was a bountiful almoner. In 1701 he returned to England, and endeavored to negotiate the sale of Pennsylvania to the crown for $60,000. This negotiation was interrupted in 1712, through his being attacked by an apoplectic fit, which, happening twice afterward, greatly impaired his mental faculties. He survived for six years longer, quite unfitted for any serious employment. Penn died July 29, 1718; and was buried at the village of Jordan, Buckinghamshire.

PENNANT, a small flag or banner. In naval affairs, a long, narrow piece of bunting, worn at the mast-heads of vessels of war.

PENNELL, MRS. ELIZABETH (ROBINS), an American writer, wife of Joseph. For many years she resided in London, and traveled extensively in Europe. Besides contributions to the "Atlantic," the "Century," and other magazines, she published numerous books, illustrated by her husband, and in some cases written in collaboration with him, the best known being: "A Canterbury Pilgrimage" (1885); "Two Pilgrims' Progress" (1886); "Our Journey to the Hebrides" (1889); "Play in Provence" (1891); "To Gipsyland" (1892); "Feasts of Autolycus" (1896); "Our Philadelphia" (1914); "The Lovers' " (1917).

PENNELL, JOSEPH, an American illustrator and author; born in Philadelphia, Pa., July 4, 1860. Besides works written in collaboration with his wife, he published: "Pen Drawings and Pen Draughtsmen" (1889); "The Jew at Home" (1892); "Modern Illustrations"; "The Work of Charles Keene" (1897); "Lithography and Lithographers" (1900); "Life of Whistler" (with Mrs. Pennell, 1910); "The Wonder of Work" (1916). Was awarded the Grand Prize at St. Louis Exposition (1904); Milan Exposition (1906); London (1913); and Florence (1914).

PENNSYLVANIA, a State in the North Atlantic Division of the United States, bounded by New York, New Jersey, Delaware, Maryland, West Virginia, Ohio, and Lake Erie; one of the original 13 States; capital, Harrisburg; counties, 67; area, 45,126 square miles; pop. (1890) 5,258,014; (1900) 6,302,115; (1910) 7,665,111; (1920) 8,720,017.

Topography.—The State presents three well defined physical divisions, the E. plain, middle hills, and W. highlands. A number of parallel ridges cross it from N. to S. with a maximum altitude of 2,500 feet. The Appalachian system in Pennsylvania, aside from its general division in two ranges, the Blue or Kittatinny, and the Allegheny, is subdivided into a great number of smaller ranges, intersected by numerous broad and fertile valleys. The W. table-land, occupying one-half the area of the State, is a broad rolling plateau, gradually descending toward Lake Erie on the N. W., and has several isolated peaks. There are six distinct water basins draining the State; the Delaware, the Susquehanna, the Genesee, the Potomac, and the Ohio rivers,

and Lake Erie. The Ohio is formed by the union of the Monongahela and Allegheny at Pittsburgh. The Susquehanna, though rising in New York, is a Pennsylvania river. The Delaware forms the entire E. boundary and passes through the Delaware Water Gap, a narrow gorge, whose sides rise perpendicularly to a height of 1,200 feet. The Lehigh river joins the Delaware at Easton. This river rises in the coal regions and flows through a region of magnificent scenery. Lake Erie forms 45 miles of the N. boundary of the State and has an excellent harbor at Erie.

Geology.—The geological formations of the State are of the Azoic, Mesozoic, and Palæozoic periods. The first is situated in the S. E. and is crossed by a narrow belt of the Mesozoic. The Palæozoic formations cover the remainder of the State. Drift deposits in the shape of sand and gravel occur in the N. and N. W. counties. The Lower Silurian occurs in Lancaster, Berks, and Lehigh counties.

Mineral Production.—Pennsylvania exceeds any other States in the value of the mineral products. This is due chiefly to the production of coal. The production of anthracite coal in the State in 1919 was 86,200,000 tons, and the bituminous coal, 145,300,000 tons. Both of these figures show a considerable decrease from 1918. The bituminous coal production reached the lowest level since 1915. Over 150,000 men are employed in and about the anthracite coal mines, with about 185,000 men in and about the bituminous coal mines. Pennsylvania ranks first in the production of petroleum, but of late years the production has fallen off, while that in other States has greatly increased. The production of crude petroleum in 1918 was 7,407,812 barrels, valued at $29,606,079. The State is a large producer of natural gas. The value of the production in 1918 was $24,344,324. The production of iron ore was 515,845 tons, valued at $982,173. The pig iron produced was 14,701,252 long tons. In addition the other more important mineral products are cement, clay products, and coke. The production of the latter in 1918 was 26,723,645 short tons, valued at $160,357,274.

Agriculture.—As an agricultural State, Pennsylvania stands high. It ranks first in the United States in the production of rye, and has large crops of other cereals. The S. E. counties are remarkably fertile, Chester being noted for its nurseries, and Lancaster for its tobacco crop. The acreage, production and value of the principal crops in 1919 were as follows: corn, 1,536,000 acres, production 72,192,000 bushels, value $106,122,000; buckwheat, 256,000 acres, production 5,530,000 bushels, value, $7,742,000; oats, 1,189,000 acres, production 36,859,000 bushels, value $29,487,000; wheat, 1,664,000 acres, production 29,055,000 bushels, value $62,758,000; rye, 228,000 acres, production, 3,648,000 bushels, value $5,727,000; tobacco, 41,000 acres, production 54,120,000 pounds, value $9,200,000; hay, 2,978,000 acres, production 4,318,000 tons, value $103,632,000; potatoes, 254,000 acres, production 25,400,000 bushels, value $39,116,000. The natural forest trees include pine, poplar, beech, sugar maple, chestnut, birch, wild cherry, walnut, oak, hickory, ash, cherry, elm, sycamore, and hemlock. Considerable attention is paid to stock raising, and dairying is becoming one of the leading industries.

Manufactures.—Pennsylvania ranks second in the United States in the value of her manufactures. Besides the leading industries of coal mining, coke, iron and steel manufacture, and the production of petroleum, the State has extensive manufactures of plate and bottle glass, paper bags, rag carpets, woolen goods, glue, railroad cars, drugs and chemicals, gunpowder, leather, and lumber. Pittsburgh, Homestead, Johnstown, and Bethlehem are noted for their extensive iron works, Pittsburgh, for glass; Pittston, Hazleton, Wilkesbarre, Shenandoah, Ashland, Pottstown, and Scranton, for their anthracite coal; Monongahela City, Irwin, Mercer, Towanda, Connellsville, Johnstown, Idlewood and Philipsburg for their bituminous coal; Philadelphia for general manufactures, locomotives and ship building; Connellsville, for coke; Altoona and Reading for railroad cars and repair shops; and Scranton for its collieries and steel works. Other important manufacturing centers are Erie, Lancaster, Easton, Allentown, Chester, York, Oil City, Norristown, Carbondale, Pottsville, Harrisburg, Corry, Phœnixville, Bristol, and Titusville. In 1914 there were 27,521 manufacturing establishments, employing 924,478 wage earners. The capital invested was $8,149,411,000, and the value of the finished product $1,688,921,000.

Banking.—On Oct. 31, 1919, there were reported 838 National banks in operation, having $120,569,000 in capital, $85,072,000 in outstanding circulation, and $444,621,000 in United States bonds. There were also 224 State banks, with $19,076,000 capital, and $328,536,000 resources; 315 loan and trust companies, with $108,987,000 capital, and $152,804,000 surplus. The exchange at the United States Clearing Houses at Phila-

delphia, for the year ending Sept. 30, 1919, aggregated $21,320,246,000.

Education.—School attendance is compulsory for children from 8 to 14 years of age. In 1919 there were 42,749 public elementary schools, with 44,992 teachers and 1,741,143 pupils. There were 911 public high schools, with 5,155 teachers and 124,015 pupils. There were 13 State normal schools, with 4,331 pupils and 282 teachers. The total expenditure for education in 1919 was about $70,000,000. The principal colleges include the University of Pennsylvania, at Philadelphia; Lehigh University, at South Bethlehem; Lafayette College, Easton; Bucknell University at Lewisburg; Haverford College, at Haverford; Swarthmore College, at Swarthmore; Pennsylvania State College, at State College; Dickinson College, at Carlisle; Franklin and Marshall College, at Lancaster; Washington and Jefferson College, at Washington; and the Carlisle Indian Training School, at Carlisle. The women's colleges include Wilson College, at Chambersburg; Pennsylvania College for Women, at Pittsburgh; Irving Female College, at Mechanicsburg; and the Moravian College and Seminary for Women, at Bethlehem.

Churches.—The strongest denominations in the State are the Roman Catholic; Methodist Episcopal; Presbyterian; Lutheran, General Council; Reformed; Regular Baptist; Lutheran, General Synod; Protestant Episcopal; Evangelical Association; United Presbyterian; United Brethren in Christ; and Dunkards, Conservative.

Railways.—The total railway mileage in 1919 was 13,139. The roads having the longest mileage are the Pennsylvania, the Delaware, Lackawanna and Western, and the Erie.

Finances.—The total receipts for the year ending Nov. 1, 1919, amounted to $41,656,169, and the expenditures to $46,382,701. There was a balance on Nov. 1, 1918, of $9,513,436, and on Nov. 1, 1919, of $4,786,904. The assessed value of real property in 1917 was $6,141,384,210.

State Government.—The governor is elected for a term of four years. Legislative sessions are held biennially in odd years, beginning on the first Tuesday in January, and are unlimited in length. The Legislature has 50 members in the Senate and 207 members in the House. There are 36 Representatives in Congress.

History.—The country about Delaware Bay was first settled by the Swedes, but they made comparatively little progress in the occupation of the country, and passed under the English jurisdiction generally established in 1664. In 1681 the territory W. of the Delaware was granted by royal charter to William Penn who colonized it; and, by the industry and high character of the Society of Friends, by cultivating peace with the Indians, and encouraging emigration, founded a flourishing State, which, long before the Revolution, became the seat of learning, wealth, and refinement. Under the charter granted to William Penn, the region forming the present State of Delaware was included, and the two colonies continued to be so joined till the Revolution of 1776. During the War of the Revolution, Philadelphia was the chief city and capital of the Federation, and Brandywine, Germantown, Valley Forge, and other points, were the scenes of memorable events, which belong to the National history. Independence was first proclaimed here, and the whole colony took a decided part in the final establishment of American liberty. In the Civil War, too, they were not less distinguished, the commonwealth sending to the National army 270 regiments and several unattached companies of volunteers, numbering in all 387,284 men. Pennsylvania was also the scene of one of the most important and most sanguinary battles of the Civil War, that of Gettysburg, the field of which has been converted into a National park, and abundantly adorned with statues and monuments. Next to the Friends, the most important immigrations were those of the Germans, who have peopled almost entirely several counties adjoining Philadelphia, and still speak the patois known as "Pennsylvania Dutch," and the Scotch-Irish, who settled in the Cumberland county region, and in many of the counties W. of the Allegheny range, and who have played a most important part in the history of the development of the State.

PENNSYLVANIA COLLEGE, a coeducational institution in Gettysburg, Pa., founded in 1832 under the auspices of the Lutheran Church; reported at the close of 1919: Professors and instructors, 35; students 500; president, W. A. Granville, Ph. D.

PENNSYLVANIA COLLEGE FOR WOMEN. An institution founded by the Presbyterian Church in 1869 to provide women with a college education, and also instruction in the social service work of the Church. It is situated in the residential section of Pittsburgh, Pa., and had in 1915 a total enrollment of 250. The buildings and grounds are now valued at $700,000.

PENNSYLVANIA DUTCH, a patois that is not, as some erroneously suppose, a corruption of German, originating in Pennsylvania, but a South-German dialect, brought from Europe, and due to a mixture of forms existing on the upper Rhine in Rhenish Bavaria, Baden, Darmstadt, Württemberg, German Switzerland, and Alsace. In the United States, chiefly in Pennsylvania, the dialect has taken up an English element. A more correct name would be Pennsylvania German.

PENNSYLVANIA STATE COLLEGE, a coeducational non-sectarian institution in State College, Pa.; founded in 1855; reported at the close of 1919: Professors and instructors, 350; students, 3,065; volumes in the library, 74,000; productive funds, $567,000; income, $1,165,877; president, Edwin Erle Sparks, Ph. D., LL. D.

PENNSYLVANIA, UNIVERSITY OF, a coeducational non-sectarian institution in Philadelphia, Pa.; founded in 1740; reported at the close of 1919: Professors and instructors, 935; students, 9,921; volumes in the library, 481,000; productive funds, $10,802,420; income, $472,886; provost, Edgar Fahs Smith, Ph. D.

PENNY, a British coin (formerly of copper, since 1860 of bronze) and money of account, the 12th part of a shilling. It was at first a silver coin weighing about 22½ grains troy, or the 240th part of a Saxon pound. Till the time of Edward I. it was so deeply indented by a cross mark that it could be broken into halves (thence called half-penny) or quarters (fourthings or farthings). Its weight was steadily decreased till at last, in the reign of Elizabeth, it was fixed at 7 grains, or the 62d part of an ounce of silver. Copper pennies were first coined in 1797, but copper half-pennies and farthings had been in use from 1672. The old Scotch penny was only a 12th of a penny sterling in value, the pound being equal to 20 pennies sterling.

In the United States the term penny is commonly used for "cent," the 100th part of a dollar. It consists of 95 per cent. of copper and 5 per cent. tin and zinc. There are 1,000,000,000 pennies in circulation throughout the country and the Philadelphia mint is turning them out at the rate of 4,000,000 a month to keep up the supply. Copper blank sheets are bought by the government large enough to cut 100 cents from. On reaching the mint the sheets are cut into strips, from which the round blanks called planchets are punched, and these run directly through the stamping machines. Then they go to an automatic weighing machine, which throws out all the imperfect coins. In 1897 Pennsylvania took the most pennies, 11,000,000. New York came next with a demand for 9,000,000, and in New Mexico, where the penny is little used, only 4,000 were asked for. It is estimated that 100,000 pennies a year are lost in various ways.

PENNYPACKER, SAMUEL WHITAKER. Born 1843 at Phœnixville, Pa. died Sept. 2, 1916. After graduating at Gettysburg University in 1863 he took up the practice of law, becoming in 1889 judge of the Court of Common Pleas in Philadelphia. From 1896–1902 he was president-judge of the same court. In 1903 he was elected governor of Pennsylvania. Governor Pennypacker was later a member of important railroad and historical commissions of the State, and for many years was president of the Pennsylvania Historical Society.

PENNYROYAL (*Mentha pulegium*), a species of mint, a native of Europe and western Asia, abundant in England and in some parts of Ireland, not found wild in Scotland, though sometimes grown there in gardens for its reputed medicinal qualities. It enjoys a high popular reputation as an emmenagogue, but no dependence may be placed in its efficacy. The name pennyroyal is given in North America to a small plant, *hedeoma pulegioides*, allied to the mints, and having, like them, a pleasant aromatic smell and a warm pungent taste. It is much in use in domestic medicine, in the form of a warm infusion, to promote perspiration and as an emmenagogue.

PENNYWEIGHT, a Troy weight, containing 24 grains, each grain being equal to a grain of wheat from the middle of the ear, well dried. Twenty pennyweights make one ounce Troy weight. The name is derived from its having been originally the weight of the silver penny.

PENNYWORT, a trailing herb (*Linaria cymbalaria*), with roundish reniform leaves, often cultivated in hanging baskets. Marsh or water pennywort is a name used for any species of the umbelliferous genus *hydrocotyle*, low herbs with roundish leaves, growing in marshy places.

PENOBSCOT, a river of Maine, having two branches. The W. branch rises near the Canadian frontier, and flows E. and S. E. to where it meets the E. branch or Seboois river. Afterward its course is S. S. W. to Penobscot Bay, a broad and sheltered inlet of the Atlantic Ocean, 35

miles long and 20 wide, with numerous islands. It is tidal and navigable for large vessels to Bangor, 60 miles from its mouth. The chief trade is in lumber.

PENOLOGY, the treatment of crime. In primitive times it had but one meaning, the extirpation of the criminal by the death sentence. In more modern times the object of penology has been to reform the criminal, and to make the punishments vary with the extent of the crime. Transportation has been employed by France, England, and Russia, but is now absolutely abandoned by England and Russia and not frequently employed by France. Imprisonment in some of its forms is at present the only punishment for crime outside of the death penalty.

Because of their crowded and altogether neglected conditions the prisons of the world up to 1776 were instruments of torture more inhuman than many devised by the famous Inquisition. About that time John Howard, an English gentleman, began his effort to improve the conditions in the English prisons, and since his time imprisonment has ceased to be so inhuman.

The modern penologist is now not so much interested in reforming conditions in the prison as he is interested in making these conditions such as will restore the prisoner to society as a useful member. Crime, it is held, is a disease, and the prison should be a hospital for those infected with crime. Under this principle there have developed three ways of treating a prisoner while in jail, the first, keeping him entirely separate night and day from all the other prisoners; the second, keeping him separate only at night, the third, a system in which the prisoner holds converse with other prisoners in proportion as he is seen to improve in conduct and attitude. It is claimed for the first method of keeping the prisoners separate, that it prevents his continued association with other criminals, gives time for reflection, and enables the influence of his teachers to have some effect. The objections to the system are its expense, its failure to teach the prisoners co-operation, and its bad mental effect. That it does have some effect in preventing criminals from again relapsing into crime after they have been released from prison, was the general opinion of the last International Prison Congress. The second method, of having a common workshop by day and yet keeping in separate cells at night, has been chiefly practiced at the Auburn Penitentiary in New York, and its financial success, because of the ability to turn out a considerable amount of goods from the prison factory, has led to its adoption in numerous other places. The third method begins with cellular confinement, then among a certain class of "good" prisoners association is permitted and finally leads to the release of the prisoner on his parole.

Many modern penologists have identified themselves with the movement to have put in force the indeterminate sentence; viz., the judge fixing the maximum penalty for the crime but allowing the prison authorities permission to release the prisoner, keeping him under watch all the time. It is claimed that it would be just as ridiculous for a doctor to prescribe a certain amount of medicine to be taken by the patient, regardless of how it affected him, as it is to sentence a man for a certain number of years regardless of his progress during the period for which he was sentenced. Under the method of the indeterminate sentence the jailer can after a few months allow the prisoner liberties, and finally release him on parole. The fact that the conduct of the prisoner in the outside world is the sure test of the sincerity of his reform has given this method considerable popularity among penologists. It is also claimed for it that it makes co-operation more possible between the prison authorities and the prisoner.

PENRHYN ISLANDS, a group in the Pacific Ocean, lat. 9° 2′ S.; lon. 157° 35′ W. They are densely wooded and populous. The British flag was hoisted on the Penrhyn Islands in 1888.

PENRITH, a market town of Cumberland, England, in a picturesque and fertile valley, on the outskirts of the Lake District, 18 miles S. S. E. of Carlisle. It has a fine old ruined castle, where Richard III. (then Duke of Gloucester) is said to have resided, and a grammar school (1395; refounded 1564). In the churchyard are two ancient monuments, the "Giant's Grave" and the "Giant's Thumb," often visited by Sir Walter Scott; and N. E. of the town is the wooded Beacon (937 feet). There are sawmills, tanneries, and breweries, but the chief trade is agricultural.

PENROSE, BOIES, United States Senator from Pennsylvania. Born in 1860 at Philadelphia, and graduated from Harvard University in the class of 1881. Two years later he was admitted to the bar in Philadelphia, but he has never practiced law very extensively, his time being taken up by the politics of the Republican party and his public duties. He first entered politics as Republican

member of the State House of Representatives, and later, in 1887, was elected to the State Senate. In 1897 the Republicans elected him to the United States Senate and have since regularly renominated and elected him. In 1919 he became Chairman of the Finance Committee of the Senate.

BOIES PENROSE

PENROSE, RICHARD ALEXANDER FULLERTON, JR., an American geologist, born in Philadelphia, Pa., in 1863. Graduated from Harvard in 1884, took a post-graduate course in the same university. He was in charge of the survey of eastern Texas in 1888 and afterward made detailed surveys in Arkansas and other states. From 1892 to 1895 he was associate professor of economic geology at the University of Chicago and was full professor from 1895 to 1911. He acted as special geologist of the United States Geological Survey and reported on several important western gold fields. He was associate editor of the "Journal of Geology" and a member of many American and foreign geological societies. He wrote many works on geological subjects, including "Geology of the Gulf Tertiary of Texas" (1889); "Manganese; Its Uses, Ores, Deposits" (1890); and "Iron Deposits of Arkansas" (1892).

PENRYN, "head of the river," a town of Cornwall, England; at the head of a creek of Falmouth harbor, 3 miles N. W. of Falmouth town. Scarce a trace remains of Glasney College, founded in 1264 for 13 Black Augustinian Canons; and none of a palace of the bishops of Exeter. Neighboring quarries supply the famous Penryn granite—the material of Waterloo Bridge, the Chatham docks, and other great public works; and the town has besides some manufactures of paper, woolen cloth, gunpowder, etc. Incorporated by James I., it was taken by Fairfax in 1646.

PENSACOLA, a city, port of entry and county-seat of Escambia co., Fla.; on Pensacola Bay, and on the Pensacola, Alabama, and Tennessee, the Louisville and Nashville, and the Gulf, Florida and Alabama railroads; 7 miles from the Gulf of Mexico. It has several orphans' and widows' homes, electric light plant, National banks, daily and weekly newspapers, a custom house, court house, and Marine Hospital. The city annually receives vast quantities of yellow pine from the forests of Alabama, and ships it to all parts of the world. The other industries include the shipment of iron, coal, cotton, and naval stores. Pensacola was settled by Spanish colonists before 1700. In 1719 it was captured by Bienville, but soon afterward was restored. The British had possession of western Florida in 1763–1781, and during the wars with Napoleon were permitted to hold Pensacola, and organize expeditions in its harbor. General Jackson seized the town Nov. 6, 1814, and the British withdrew, after blowing up the fort. In 1818 Jackson again seized the place in prosecution of the Seminole War, on the plea that the Spanish authorities aided the Indians. Pop. (1910) 22,982; (1920) 31,035.

PENSACOLA BAY, an inlet of the Gulf of Mexico, at the W. extremity of Florida, defended at its entrance by Fort Pickens, on Santa Rosa Island, and Fort McRea on the mainland. The entrance between Santa Rosa Island and the mainland is a mile wide. Besides a lighthouse, there are a navy yard, marine hospital and barracks, and in the vicinity the villages of Bagdad and Milton.

PENSIONS. See UNITED STATES.

PENSIONS, MOTHERS', the granting of state subsidies to widowed, deserted and, sometimes, divorced women with dependent children. Mothers' pensions are entirely of modern origin, and may be considered as a phase of the general tendency toward recognition of the

responsibility of the state in regard to the welfare of its more handicapped citizens. In this country it may be said that the sentiment for mothers' pensions first found practical expression in 1912, when the State of Washington passed a law granting a subsidy to widowed women with dependent children. Divorced and deserted women were excluded from the benefits of the law, on the theory that it tended to encourage divorce and desertion on the part of the husbands. This law was amended in 1919 to include divorced and deserted women as well. The example of Washington was rapidly followed by other State legislatures, until, in 1920, thirty-six States made more or less provision for unsupported women with dependent children. As illustrations: in California only widows are included; in Colorado any parent unable to care for its children is included; in Illinois pensions are granted to widows or women with incapacitated husbands; in Idaho the recipient must be a widow, or a woman with a husband in the penitentiary or in an insane asylum; in Kansas pensions are granted to women widowed, divorced, or with husbands physically incapacitated or in the penitentiary or in an insane asylum, or deserted by her husband for more than three months. Throughout all the States the pensions average from $21 to $24 a month.

PENSIONS, OLD AGE. See OLD AGE PENSIONS.

PENTACRINUS, in zoölogy, the typical genus of the *Pentacrinidæ*. The column is pentagonal. *P. caput medusæ* is found in the Caribbean Sea; *P. europæus* is the larva of *Antedon rosacea*. In palæontology, seven species are known in the Lias, seven in the Jurassic, three in the Cretaceous, and three in the Eocene strata. Of these, *P.* (*extracrinus*) *briareus*, from the Lower Lias of Lyme Regis, has extraordinarily ramified arms or rays.

PENTAGON, a figure of five sides and five angles; if the sides and angles be equal it is a regular pentagon; otherwise, irregular.

PENTAMERA, one of the primary sections into which coleopterous insects (beetles) are divided, including those which have five joints on the tarsus of each leg.

PENTAMETER, a verse of five feet, used especially in Latin and Greek poetry, in which the first two feet may be either dactyls or spondees, the third must be a spondee, and the last two anapæsts; or it may be considered as consisting of two parts, each containing two feet and a syllable; the first half consists of two dactyls or spondees and a long syllable, the second half must consist of two dactyls and a syllable. Hexameter and pentameter verses used alternately constitute what is called elegiac measure.

PENTATEUCH, a term applied exclusively to the first five books of the Old Testament collectively, termed in Hebrew *torah*=the law. The first mention of the five-fold division is made by Josephus. It seems to have been made by the Septuagint translators, who then bestowed on the volume a Greek name expressive of what they had done. Samaritan Pentateuch, the Pentateuch in use among the Samaritans. Words which have in them *d* and *r*, and again *i* and *v*, letters unlike in the Samaritan, but very similar in Hebrew [(*d*) and (*r*), also (*i*) and (*v*)], are sometimes interchanged, showing that the work was derived from a Hebrew original. The passages attributed to Ezra are in it. It substitutes Mount Gerizim for Mount Ebal in Deut. xxvii: 4. The text in various places differs from the Hebrew, generally however agreeing with the Septuagint. The chronology also is in places at variance with that of the Hebrew Bible. If Josephus is correct as to the date of the building of the Temple on Mount Gerizim, the Samaritan Pentateuch was made probably about 330 B. C., though the popular belief is that it is much older.

PENTECOST, one of the three greatest Jewish festivals. Its Greek name was given because it was held on the 50th day, counting from the second of the Passover (Lev. xxiii: 15, 16), whence it was called in Hebrew the Feast of Weeks (Deut. xvi: 9, 10). It was called also the Feast of Harvest, or Firstfruits of Wheat Harvest (Exod. xxiii: 16; xxxiv: 22). When it came every Jewish male had to present himself before Jehovah (Exod. xxiii: 17; xxxiv: 23). Meat or wave offerings, especially two wave loaves, and sacrifices were presented at the festival (Lev. xxiii: 16, 17, etc.; Num. xxviii: 26–31; Deut. xvi: 9–12). The Holy Spirit descended on the members of the infant Christian Church on the day of Pentecost, imparting the gift of tongues (Act. ii: 1–20). In ancient times the pentecost lasted but a single day, but modern Judaism extends it to two. Also, Whitsuntide, a feast which, reckoned inclusively, is 50 days after Easter.

PENTECOSTAL CHURCH OF THE NAZARENE, a religious organization established in the United States in 1908, having as its fundamental tenet the sanctification of those believing by faith, as a work of grace subsequent to and separate from justification. The community was formed by the association of numerous church bodies, having 230 churches and over 11,000 members. Its ministers numbered on its formation nearly 600 and it has since established a theological seminary at Los Angeles, Cal., schools and bible institutes at Pilot Point, Tex., and a college at North Scituate, R. I. In addition there are institutions belonging to the community in other centers, among them the Holiness College at Vilonia, Ark., and the Holiness University at Peniel, Tex. The official organs are the "Nazarene Messenger," the "Holiness Evangel," and the "Beulah Christian." Since its formation the number of communicants belonging to it has more than doubled.

PENTLAND FIRTH, a channel between the Atlantic and German Oceans, separating the mainland of Scotland from the Orkney Islands. It is 14 miles long and 6¼ miles broad at the narrowest. The Pentland Skerries, 5 miles N. E. of Duncansbay Head, consists of two islets and of several contiguous rocks. On the larger of the islets is a lighthouse (1794). Although navigation of the Pentland Firth is more dangerous than that of any other portion of the Scotch seas, over 5,000 vessels with cargoes pass through the Firth annually.

PENTLAND HILLS, in the Lowlands of Scotland, extend 16 miles S. W. from a point 3 miles S. of Edinburgh, through the counties of Midlothian, Peebles, and Lanark, have a breadth of 4 to 6 miles, and attain a maximum height in Carnethy (1,890 feet) and Scald Law (1,898). In the battle of the Pentlands or Rullion Green, 2 miles N. N. W. of Penicuik, Sir Thomas Dalyell routed 900 Westland Covenanters, Nov. 28, 1666.

PENTONVILLE, a populous district in London in the parish of St. James, Clerkenwell; the first buildings in which were erected in 1773 on fields belonging to Henry Penton. The name has since been extended to part of the parish of Islington, in which stands the Pentonville Prison, built in 1840–1842, and constructed on the radiating principle, so as to admit of thorough inspection. The treatment is designed to "enforce strict separation, with industrial employment and moral training."

PENTSTEMON, or **PENTESTEMON**, a genus of plants, order *Scrophulariaceæ*. They are perennial herbs, rarely having woody stems, branching, paniculate, with opposite leaves; and showy red, violet, blue, or white flowers. *P. pubescens*, the beard tongue, is a handsome plant growing on river banks, bluffs, hills, and barrens, in the United States.

PENUMBRA, a faint shadow thrown by a luminous body. It is brighter than the true shadow, though less so than the luminous body itself. It is a modification of the true shadow produced by the commingling with it of rays emitted by a portion of the luminous body. In an eclipse of the moon, the rays which have just grazed the edge of the earth are bent inward by the refraction of the atmosphere, besides having become tinged with a ruddy or copper hue. Falling on the moon, then in shadow, they often render it faintly visible, and though of a copper hue, yet bright enough to permit markings on its surface to be seen. Yet at this time the moon is so much behind the earth that it cannot be reached by any direct rays from the sun. In an eclipse the periods when the first and the last contact with the penumbra will take place are always carefully noted.

PENZA, a government of Russia. It has an area of about 15,000 square miles. The surface of the country is rolling, and slopes toward the N. W. The principal rivers are the Moksha and the Sura. The climate is severe. The chief occupation is agriculturing, and rye, oats, and wheat were produced in large quantities before the World War. There are also important manufacturing industries which employed, before the war, over 12,000 men, with an annual production valued at $10,000,000. The chief products were paper, flour, oil, and matches. Pop. about 1,875,700. The capital is the city of the same name. It is the seat of the Greek Catholic Bishop and has a monastery and convent and several schools. There were, before the war, important manufactures of paper, lumber, flour and iron. Pop. about 80,000.

PENZANCE, a town of Cornwall, England; at the head of Mount's Bay, 10 miles E. N. E. of Land's End. Standing on a finely-curved shore, surrounded by rocky eminences, it is famous for its mild, equable climate, though the annual rainfall is heavy (43 inches). Its fine esplanade commands splendid land and sea views; and its chief buildings, constructed largely of granite, include a market hall (1837) with a statue before

it of Sir Humphry Davy; and public rooms (1867), Italian Renaissance in style, and comprising a guildhall, museum, library, etc. The harbor has two piers (1772–1845) half a mile long, forming a tidal basin of 21 acres; and docks have been added since 1882. Penzance is a headquarters of the mackerel and pilchard fisheries. Pop. (1917) about 15,000. Burned by Spaniards in 1595, and sacked by Fairfax in 1646, it was incorporated in 1614, and from 1663 to 1838, was one of the five "coinage towns."

PEONAGE, a system of agricultural servitude common in Mexico, and some other parts of Spanish America. The peon in debt to his employer was by the Spanish colonial system bound to labor for his employer till the debt was paid. Peonage in New Mexico was abolished by Act of Congress in 1867; it was also abolished in the Argentine Republic.

PEONY, a genus of plants belonging to the natural order *Ranunculaceæ*, and very generally cultivated in gardens for the sake of their large showy flowers. The species are mostly herbaceous, having perennial tuberous roots and large deeply-lobed leaves. The flowers are solitary, and of a variety of colors, crimson, purplish, pink, yellow, and white. The flowers, however, have no smell, or not an agreeable one, except in the case of a shrubby species, *P. Moutan*, a native of China, of which several varieties, with beautiful whitish flowers stained with pink, are cultivated in gardens. The roots and seeds of all the species are emetic and cathartic in moderate doses. *P. officinalis* or *festiva*, the common peony of cottage gardens, was formerly in great repute as a medicine.

PEORIA, a city and county-seat of Peoria co., Ill.; on the Illinois river, and on the Chicago, Peoria, and St. Louis, the Chicago and Alton, the Chicago, Rock Island and Pacific, the Burlington Route, and other railroads; 160 miles S. W. of Chicago. It is built at the foot of Peoria Lake, an expansion of the Illinois river, and has a water frontage of about four miles. It covers an elevated plateau, extending back to a high bluff, on which many fine residences have been erected. A beautiful system of parks and driveways is laid out. The city contains 35 miles of paved streets, electric light and street railroad plants, high and graded schools, a public library, Peoria Law Library, hospitals, National and private banks, and many daily and weekly newspapers. There is an excellent street system. It also has barrel factories, foundry and machine products, planing mills, flour and grist mills, glucose factories, strawboard mills, rolling mills, lead works, stock yard, meat packing plants, wagon and buggy factories, grain elevators, etc., comprising in all over 600 establishments. The site of Peoria was first chosen by La Salle in 1680 as a trading post. It was settled in 1779, and incorporated as a city in 1845. The assessed property valuation is nearly $9,500,000. Pop. (1890) 41,024; (1900, with South and West Peoria annexed since 1890) 56,100; (1910) 66,950; (1920) 76,121.

PEPIN, grandson of Charlemagne, and son of Louis le Debonnaire, became King of Aquitaine in 817. He died in 838 or 839.

PEPIN, THE SHORT, a King of France, the first of the Carlovingian kings. He was at first mayor of the palace under Childeric III.; but in 752 he dethroned that monarch and confined him in a monastery. Having requested and obtained the sanction of the Pope, Pepin was constituted king. He assisted Pope Stephen III. against the Longobards, defeated the Saxons, Bavarians, and other German nations, and united Aquitaine to his crown. After a reign of 16 years, he died in St. Denis, in 768. His son Charlemagne succeeded him as King of the Franks.

PEPPER, GEORGE WHARTON, a Philadelphia lawyer and church authority. Born in Philadelphia in 1867, and graduated from the University of Pennsylvania in the class of '87. For a few years he practiced law, and then in 1893, became professor of law at the University of Pennsylvania. In addition to his legal studies he has taken a great interest in the law and polity of the Protestant Episcopal Church. He is the author of a number of works on ecclesiastical and legal matters.

PEPPER, WILLIAM, an American physician and university president; born in 1843. He was educated at the University of Pennsylvania, and took up the practice of medicine in the city of Philadelphia, where he became connected with several large hospitals. In 1868 he became professor of anatomy at the University of Pennsylvania, and from 1881 to 1894 was provost of the University. He devoted much time and attention to the medical school, which, under his direction, took a front rank among the leading medical schools in the United States. He died in 1898.

PEPPER, the dried immature fruit or berry of *P. nigrum*, used as a condi-

ment, whole or ground. White pepper is the berry deprived of its outer husk. It is imported into this country chiefly from Java, Sumatra, Malacca, and Borneo, and is named after the locality from which derived; thus, Penang, Malabar, Sumatra, Trang, etc. The ground peppers of commerce are generally mixtures of different kinds of berries; *e. g.*, Malabar is used to give weight, Penang or Trang to give strength, and Sumatra to give color. Long pepper (*P. longum*), which belongs to the same natural order, and contains almost the same constituents, must be considered a true pepper, though of less value commercially.

PEPPERMINT, *Mentha piperita*, a mint with oblong, lanceolate, serrate, glabrous leaves; pedicels and flowers nearly smooth; flowers in cylindrical spikes, interrupted below. Probably a garden form of *M. aquatica*. Oil of peppermint, the oil distilled from the fresh flowers of *M. piperita*.

PEPSIN, an azotized ferment, related to the proteids, and contained in gastric juice. It possesses the power, in conjunction with hydrochloric acid, of dissolving the insoluble proteids and converting them into peptones. Pepsin is prepared from the stomach of the pig or calf on a commercial scale.

PEPTONE, the products of the action of pepsin, or acid gastric juice on albuminous substances. They are only found in the stomach and small intestines, are highly diffusible, readily soluble in water, and are not coagulated with boiling.

PEPYS, SAMUEL, an English author, secretary to the admiralty in the reigns of Charles II. and James II.; born in Brampton, Huntingdonshire, in 1632, and educated at Cambridge. He early acquired the patronage of Sir Edward Montagu, afterward Earl of Sandwich, who employed him as secretary in the expedition for bringing Charles II. from Holland. On his return he was appointed one of the principal officers of the navy. In 1673, when the king took the admiralty into his own hands, Pepys was appointed secretary to that office, and performed his duties with great credit. During the excitement of the Popish Plot he was committed to the Tower, but was after some time discharged without a trial, and reinstated in his office at the admiralty, which he held till the abdication of James II. He was president of the Royal Society for two years; but his title to fame rests upon his "Diary" (1659–1669), which is a most entertaining work, revealing the writer's own character very plainly, giving an excellent picture of contemporary life, and of great value for the history of the court of Charles II. It is in shorthand, was discovered among a collection of books, prints and manuscripts bequeathed by Pepys to Magdalene College, Cambridge, and was first printed in 1825. He died in 1703.

SAMUEL PEPYS

PEQUOT, FORT, an old Indian fort on Pequot Hill, about 8 miles N. E. of New London, Conn.

PEQUOTS, or PEQUODS, a tribe of American Indians, a branch of the Mohicans, were warlike and powerful in the country round the Thames river when Connecticut was first settled, and made treaties with the Dutch and English. Hostilities, however, broke out in 1637; and the tribe was cut to pieces and scattered; yet a few descendants may be found at Green Bay, Wis.

PERÆA, a term applied to many districts beyond a river or sea; most frequently to great part of Palestine beyond the Jordan.

PERAK, a Malay state on the W. side of the peninsula of Malacca, under the protection of Great Britain since 1874; estimated area, 7,800 square miles. The interior ranges up to 8,000 feet. The soil is fertile, and for the most part covered with luxuriant vegetation. Elephants, leopards, huge snakes, and deer swarm in the forests of the interior. The soil produces rice, sugar, tobacco, coffee, tea, vanilla, and spices. But the principal production of the state is tin. Lead also exists in great quantity. The

capital is Kwala Kansar. Taiping and Kinta are the principal tin mining towns. There are over 70 miles of railway. Pop. (1911) 494,057.

PERCEPTION, the reception of knowledge through the senses, and the faculty by which knowledge is so received and communication maintained between the subject and the external world. Perception differs from conception, in dealing with things that have an actual, not merely a possible existence; and from consciousness, in that it is concerned with objects external to the mind of the percipient. It is, in brief, the taking cognizance of impressions received by the senses.

PERCH, *Perca fluviatilis*, the river perch. The upper part of the body is of a warm, greenish-brown tint, becoming golden on the sides, and white on the belly; there are always broad, vertical, dark bands passing down the sides. The perch is generally distributed over America, Europe, and northern Asia, frequenting still waters, and sometimes descending into brackish waters. Perch feed on smaller fish, insects, and worms. The female deposits her eggs, united by a viscous matter, in long bands, on aquatic plants. The Great Lakes in the United States abound in perch.

PERCHLORIC ACID, ($ClHO_4$) a colorless liquid obtained by distilling potassium perchlorate with sulphuric acid. When brought in contact with organic substances, it explodes with great violence.

PERCUSSION, a method of physical examination, performed by gently striking some part of the body—especially the chest or the abdomen—with the fingers or an instrument, to ascertain its healthy or diseased condition. Also in music, an ingenious contrivance whereby a hammer strikes the tongue of a reed and sets it in motion simultaneously with the admission of air from the wind chest, thus securing the rapid speech of the reed. It is commonly used in cabinet organs, but has also been applied to the largest reeds of a church organ.

PERCY, the name of a noble family who went to England with William the Conqueror, and whose head, WILLIAM DE PERCY, obtained 30 knights' fees in the N. of England. A descendant, also named WILLIAM, who lived in the early part of the 12th century, left behind him two daughters, the elder of whom died childless, and the younger, Agnes, married Josceline of Lorain, brother-in-law of Henry I., who assumed the surname of his bride. His son, RICHARD DE PERCY, was one of the 25 barons who extorted Magna Charta from King John. His great-grandson, HENRY, LORD PERCY, was created Earl of Northumberland in 1337. He was marshal of England at the coronation of Richard II., against whom, however, he took up arms, and succeeded in placing the crown on the head of the Lancastrian aspirant, Henry IV. He took up arms against this king also, but his forces were beaten at Shrewsbury (1403), where his son, Henry Percy (Hotspur), fell; and again at Bramham Moor (Feb., 1408), where he himself fell. His titles were forfeited, but were revived in favor of his grandson HENRY, who was appointed lord high constable of England, and who fell fighting in the Lancastrian cause at St. Albans (1453). For the same cause his son and successor shared the same fate at Towton (1461). The 4th earl was murdered during a popular rising, caused by his enforcing a subsidy ordered by the avaricious Henry VII. The 6th and 7th earls fell by the hands of the executioner in the reigns of Edward VI. and Elizabeth respectively. The 8th died a violent death in the Tower, where he was confined on a charge of taking part in a plot in favor of Mary of Scotland. ALGERNON, the 10th earl, took part in the civil war against Charles I., and afterward used all his influence to bring about the Restoration. JOSCELINE, the 11th earl, died without male issue; his only daughter married Charles, Duke of Somerset, and became the mother of ALGERNON, DUKE OF SOMERSET, who was created Earl of Northumberland, with remainder to his son-in-law, SIR HUGH SMITHSON, a Yorkshire baronet of good family. The latter succeeded to the earldom in 1750, assuming the name of Percy, and in 1766 received the ducal title. The present duke thus represents the female line of the ancient historical house.

PERCY, THOMAS, an English poet; born in Bridgenorth, Shropshire, April 13, 1728 or 1729; was a minister of the English Church; was made dean of Carlisle in 1778, and bishop of Dromore in 1782. He made a collection of old popular ballads and songs, published under the title "Reliques of Ancient English Poetry" (1765), which ultimately transformed English poetic style and matter. He wrote the ballad "The Hermit of Warkworth," and the song "O Nanny, Wilt Thou Gang wi' Me?" He died in Dromore, Ireland, Sept. 30, 1811.

PERCY ANECDOTES, a collection of extraordinary popularity, published in monthly parts (1820–1823) by "Sholto

and Reuben Percy, Brothers of the Benedictine Monastery of Mount Benger." Their real names were Thomas Byerley (died 1826), first editor of the "Mirror," and Joseph Clinton Robertson (died 1852), projector and editor of the "Mechanics' Magazine"; the work owed its name to the Percy coffee house in Rathbone Place, their usual place of meeting during its progress. An edition was prepared by John Timbs (1868), and another enlarged edition in 1887.

PEREKOP, ISTHMUS OF, in S. Russia, connecting the peninsula of the Crimea with the mainland of European Russia. In the N. of the isthmus is the small town of Perekop.

PÉREZ GALDÓS, BENITO, a Spanish novelist. He was born in the Canary Islands in 1845, and studied law at Madrid, but followed literature as a career. He was a member of the Cortes for a time, and while there gave evidence of the revolutionary ideals that showed in his historical romances. He wrote voluminously, and completed 20 stories of his "Episodios Nacionales" series by 1883. His best known work is "Doña Perfecta" which appeared in 1876. Others are "Gloria"; "La Familia de León Roch"; "Marianela"; "El Amigo Manso"; "El Doctor Centeno"; "Fortunata y Jacinta"; "Miau"; "Angel Guerra"; "Nazarin"; "Misericordia." He also wrote several plays. He died in 1920, statues having been erected to him in his lifetime, and national subscriptions being gathered to honor him.

PERFECTIONIST, in ecclesiastical and Church history, one who believes in the possibility of living without sin; a perfectibilist. Any member of an American sect of Antinomian Communists, which was founded about 1854, by John Humphrey Noyes, who had been an Independent minister at Yale College. He professed to have discovered from the writings of St. Paul that all Christian sects were in spiritual darkness, and determined to establish a church of his own. He founded a community at Oneida, N. Y., and others subsequently at Wallingford, New Haven, and New York, in order to carry out what he asserted to be a divinely revealed system of society, based on the following principles: (1) Reconciliation with God; (2) salvation from sin; (3) brotherhood of man and woman; and (4) community of labor, and of its fruits. They are called also Bible Communists. All possessions of the sect are held in common.

PERFUMES, substances emitting an agreeable odor, and used about the person, the dress, or the dwelling, having also some value as disinfectants. Perfumes of various sorts have been held in high estimation from the most ancient times. The Egyptians, Hebrews, Phœnicians, Assyrians, and Persians are known to have made great use of them, as did also the Greeks and Romans. Perfumes are partly of animal but chiefly of vegetable origin. They may be divided into two classes, crude and prepared. The former consist of such animal perfumes as musk, civet, ambergris, and such vegetable perfumes as are obtained in the form of essential oils. At the present time the manufacture of perfumes is chiefly carried on in Paris and London, and in various towns near the Mediterranean, especially in the S. of France. Certain districts are famous for certain productions; as Cannes for its perfumes of the rose, tuberose, cassia, jasmine; Nîmes for thyme, rosemary, and lavender; Nice for the violet and mignonette. England claims the superiority for her lavender, which is cultivated on a large scale at Mitcham in Surrey.

PERGAMUS, in ancient geography, a city of Mysia, in Asia Minor, noted for the magnificence of its buildings, and as the place where parchment was first made, and tapestry, called by the Romans *aulæa,* first worked. After the battle of Issus it became the capital of a kingdom, and flourished for more than 150 years, till conquered by the Romans, 120 B. C. It was destroyed during the Turkish wars, but its extensive ruins are still visible.

PERI, according to the mythical lore of the East, a being begotten by fallen spirits, which spends its life in all imaginable delights, is immortal, but is forever excluded from the joys of Paradise. It takes an intermediate place between angels and demons, and is either male or female. The Peris live in constant warfare with the Devs. Otherwise, they are of the most innocuous character to mankind, and are just like the fairies. They belong to the great family of genii, or Jinn.

PERIANDER, one of the seven reputed sages of Greece, a tyrant of Corinth, who succeeded his father, Cypselus, 625 B. C., and died with the reputation of an able ruler, 585 B. C. He was a man of licentious manners, and, in the latter part of his reign, became a cruel ruler.

PERIANTH, the envelope surrounding the reproductive organs in a flower, when the calyx and corolla are not easily

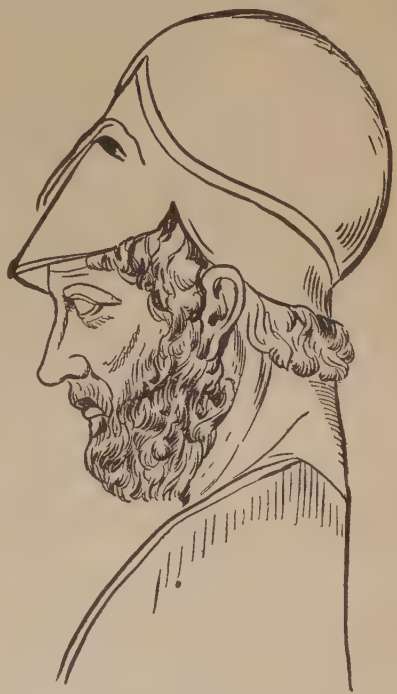
discriminated. Example, the petaloid or colored portion of a lily.

PERICARDIUM, a conical membranous sac containing the heart and the commencement of the great vessels, to the extent of about two inches from their origin. It is placed with its apex upward behind the sternum in the interval between the pleuræ—the serous sacs in which the lungs are inclosed; while its base is attached to the diaphragm. It is a fibro-serous membrane, consisting of an external fibrous and an internal serous layer. The outer layer is a strong, dense, fibrous membrane; the serous layer invests the heart, and is then reflected on the inner surface of the fibrous layer. Like all serous membranes, it is a closed sac; its inner surface is smooth and glistening, and secretes a thin fluid which serves to facilitate the natural movements of the heart. It is inflammation of this serous sac which constitutes the disease that is known as pericarditis.

Pericarditis is a disease which occasionally runs a very rapid course, and terminates fatally in 48 hours or less. In ordinary cases, however, which terminate in apparent recovery, the disease generally begins to yield in a week or 10 days, and excepting that adhesion may remain, the cure appears to be complete in three weeks or less.

The treatment of pericarditis at present in favor is much less active than when bleeding, mercurialization, etc., were considered necessary. Complete rest in bed, light diet, with opium or other sedatives as required; general medication suited to the disease with which the pericarditis is associated, local application of poultices or cotton wool, sometimes of leeches or blisters, are the chief measures employed.

PERICLES, the great Athenian statesman; born in Athens about 495 B. C., of a noble, influential and wealthy family. He received a careful education from the most eminent teachers. He applied himself to the study of philosophy under the guidance of Anaxagoras. To his other acquirements he added that of extraordinary eloquence, and thus prepared, he began to take part in public affairs about 469 B. C., and the popular party soon recognized him as their chief. He effected a great change in the constitution of the Areopagus, the stronghold of the aristocratic party, by which its authority was much limited, and Cimon, the head of that party, was immediately ostracized. Pericles was great as a general, and he displayed extraordinary valor at the battle of Tanagra; he commanded the expedition against Sicyon and Acarnania; recovered Delphi from the Spartans, and quelled the revolt of Eubœa. In 444 B. C. he became sole ruler of Athens. Under his administration the navy was increased, commerce extended, general prosperity advanced, and Athens adorned with noble buildings. Phidias was the friend of Pericles, and under his direction the Parthenon, the Propylæa, the Odeon, and the other temples and monuments, the admiration of all time, were erected. In 444 B. C. Pericles established



PERICLES

a democratic constitution in Samos, and a counter-revolution taking place, he besieged the town, and after nine months reduced it. Pericles directed Athens during the first two years of the Peloponnesian War, in the second year of which the plague broke out at Athens, and the popular discontent vented itself in the prosecution of the great ruler. He was fined, but soon regained his influence. The plague carried off many of his friends and relatives, and, last of all, his favorite son, Paralus. This loss broke his heart, and after a lingering sickness he died 429 B. C.. He left a son by Aspasia, who took his father's name, and was ultimately legitimated by the people.

PERIDOTE, a name given by jewelers to the green transparent varieties of olivine. It is usually some shade of olive-green or leek-green. Peridote is found in Brazil, Ceylon, Egypt, and Pegu. It is a very soft gem stone, difficult to polish, and, when polished, liable to lose its luster and to suffer by wear.

PERIGEE, the point in the moon's orbit at which she is nearest the earth.

PÉRIGORD, an old province of France. It formed part of the military government of Guienne and Gascony, and is now represented by Dordogne and part of Lot-et-Garonne.

PÉRIGUEUX, a town of France, formerly capital of Périgord, now in the department of Dordogne; on the right bank of the Isle, a tributary of the Dordogne; 95 miles N. E. of Bordeaux. It consists of the ancient city, which is gloomy in aspect and has narrow streets, with numerous houses and other remains of mediæval and Renaissance architecture, and the Puy St. Front, which till 1269 was a separate and a rival town. The cathedral of St. Front is a Byzantine edifice, said to be a copy of St. Mark's at Venice, built in 984–1047, but spoilt by "restoration" in 1865. The museum is especially rich in Roman and other antiquities. Statues of Montagne, Fénelon, and the soldiers Daumesnil and Bugeaud adorn public places in the town. Iron is mined and worked, and woolens are manufactured. The celebrated *pâtés de Périgueux*, made of partridges and truffles, are largely exported. Périgeux, a town of the highest antiquity, is the Gallic Vesunna mentioned by Cæsar. The Romans built another town on the opposite side of the river at the junction of five Roman roads. Close to the modern town are the remains of a vast amphitheater, aqueducts, baths, and temples. The tower of Vesunna is the most remarkable fragment of Roman architecture. It is 89 feet high, 200 feet in circumference, and has walls 6 feet thick, but has neither doors nor windows. Its purpose is not known. The district of Périgord is noted for its archæological finds. Pop. (1911) 33,548.

PERIHELION, or **PERIHELIUM**, the part of a planet's or comet's orbit where it is nearest the sun, as opposed to aphelion. One of these is said to be in perihelion when it is at the extremity of the major axis of the elliptical orbit nearest the focus occupied by the sun.

PERIM, a barren island, and coaling and telegraph station, belonging to Great Britain, in the Strait of Bab-el-Mandeb, at the S. entrance to the Red Sea, 97 miles W. of Aden. It is about 3½ miles long by 2½ wide, and crescent shaped, the two horns embracing a deep and spacious harbor. The island was held by the British in 1799–1800, and was again occupied in 1857. In 1883 it was made a coaling station, and soon began to be a rival to Aden.

PERIMETER, in geometry, the bounds or limits of any figure or body. The perimeters of surfaces or figures are lines; those of bodies are surfaces.

PERIOD, in geology, one of the largest divisions of geological time. In this sense there are at least three periods, the Primary, the Secondary, and the Tertiary periods, to which a fourth or Quaternary one is sometimes added; also their subdivisions; as, the Glacial period. In mathematics, a number of figures considered together; one of two or more sets of figures or terms marked off by points or commas placed regularly after a certain number, as in numeration, in circulating decimals, or in the extraction of roots. In music, two or more phrases ending with a perfect cadence. In pathology, an interval more or less fixed in point of time at which the paroxysms of a fever, etc., recur. In printing, the full stop (.) which marks the end of a sentence in punctuating, or indicates an abbreviation, as Mr., Jan., B. C., etc. In rhetoric, a complete sentence from one full stop to another; a sentence so constructed as to have all its parts mutually dependent.

PERIOD, a term used in chronology in the same sense as cycle, to denote an interval of time after which the astronomical phenomena to which it refers recur in the same order. It is also employed to signify a cycle of cycles. The Chaldæans invented the Chaldaic period, or period of eclipses, from observing that, after a certain number of revolutions of the moon round the earth, her eclipses recurred in the same order and of the same magnitude. The Egyptians made use of the dog-star, Siriacal, or Sothric period, as it is variously called, to compare their civil year of 365 days with the true or Julian year of 365¼ days. The period consequently consisted of 1,460 Julian years, corresponding to 1,461 Egyptian years, after the lapse on which the dates in both reckonings coincided. By comparing the solar and lunar years Meton, an Athenian, invented (432 B. C.) a lunar period of 6,940 days, called from him the Metonic cycle, also the lunar cycle. The Calippic period was invented by Calippus, and consisted of four Metonic cycles less by one day, or 27,759 days. But as this period still gave a

difference of six hours between the solar and lunar reckonings, it was improved by Hipparachus, who invented the Hipparchic period of four Calippic periods, less by one day, or 111,035 days, or about 304 Julian years. The period of the heliacal or solar cycle, after which the same day of the month falls upon the same day of the week, consists of 28 Julian years. The solar cycle is supposed to have been invented about the time of the Council of Nice (A. D. 325), but it is arranged so that the first year of the first cycle corresponds to 9 B. C. In calculating the position of any year in solar cycle care must be taken to allow for the omission of the intercalary day at the beginning of each century, and its insertion in the last year of every fourth century. The Julian period is a cycle of cycles, and consists of 7,980 (=28×19×15) years, after the lapse of which the solar cycle, lunar cycle, and the indiction commence together. The period of its commencement has been arranged so that it will expire at the same time as the other three periods, from which it has been derived. The year 4713 B. C. is taken as the first year of the first period.

PERIODICALS, publications which appear at regular intervals, and whose principal object is not the conveyance of news (the main function of newspapers), but the circulation of information of a literary, scientific, artistic, or miscellaneous character, as also criticisms on books, essays, poems, tales, etc. The first periodical was published in France, being a scientific magazine, the "Scientists' Journal," issued in 1665. The most famous French literary periodical is the "Review of Two Continents," begun in 1829. The earliest English periodical seems to have been the "Weekly Memorials for the Ingenious," the first number of which is dated January, 1681–1682, and which lasted but a year. In the 18th century a number of monthly reviews appeared, including the "Monthly Review" (1749–1844); the "Critical Review" (1756–1817); the "British Critic" (1793–1843); the "Anti-Jacobin Review and Magazine" (1798–1821). At length in 1802 a new era in criticism was introduced by the "Edinburgh Review," the organ of the Whigs, which came out every three months, and soon had a formidable rival in the "Quarterly Review" (1809), the organ of the Tories. In 1824 the "Westminster Review" was started by Bentham as the organ of utilitarianism and radicalism, and with it was afterward incorporated the "Foreign Quarterly Review" (1827–1846); and in 1836 the "Dublin Review" was established as the organ of the Roman Catholic party. To meet the demand for critical literature at shorter intervals than three months, there was published in 1865 the "Fortnightly Review," which for about a year was true to its name, but has since appeared monthly. It was followed by the "Contemporary Review" (1866) and the "Nineteenth Century" (1877). Among the more recent periodicals of this class (in which literary criticism occupies but a small space) are the "National Review" (1883), a Conservative organ; the "New Review," a monthly begun in 1889; and the "Review of Reviews," a monthly giving extracts from all the current periodicals, begun in 1890. The "Athenæum" (1828), "Academy" (1869), "Saturday Review," "Spectator," and "Speaker" (all weekly publications) combine the character of the review with more or less of that of the newspaper.

Passing over the "Tatler" (1709–1710), "Spectator" (1711–1712, revived 1714), etc., which may be considered to be *sui generis*, the first English magazine properly speaking may be said to be the "Gentleman's Journal, or Monthly Miscellany," commenced in 1692. It was followed in 1731 by the "Gentleman's Magazine," published by Cave. The success of Cave's venture brought out a host of imitators. The "London Magazine" (1732–1784), the "Scots Magazine" (1739–1817), the "European Magazine" (1782–1826), and the "Monthly Magazine" (1796–1829), were among the chief of this class which were originated in the 18th century. In 1817 appeared the first number of "Blackwood's Edinburgh Magazine," which soon distanced all its predecessors. Closely approaching it in point of merit stood the "New Monthly Magazine," "Fraser's Magazine," "Tait's Edinburgh Magazine," and the "Dublin University Magazine." A new era in this kind of literature was inaugurated by the shilling monthlies, some of them with excellent illustrations, the first being "Macmillan's Magazine" (1859), "Cornhill Magazine" (1860), "Temple Bar" (1860); closely followed by a number of others. Another step in the direction of cheapness was shortly afterward made by the publication of monthly magazines at sixpence, including the "Argosy," "Good Words," the "Sunday Magazine," etc., followed at a long interval by "Longman's Magazine," the "English Illustrated Magazine," "The Strand," etc. Weekly periodicals to suit the taste of all classes, at prices from 2 to 6 cents, have come into fashion since 1832, when the initiative was taken by the "Penny Magazine" and "Chambers'

Journal." The most popular American reviews and magazines of our times are "Harper's Monthly Magazine," the "Atlantic Monthly," "Scribner's Magazine," "Century Magazine," "The Cosmopolitan," "The Metropolitan," "Munsey's Magazine," "McClure's Magazine," "American Magazine," "Everybody's," "American Review of Reviews," "The World's Work," etc.

PERIODICITY, the disposition of certain things or phenomena to recur at stated periods. It denotes the regular or nearly regular recurrence of certain phenomena of animal life, such as sleep and hunger.

PERIOPHTHALMUS, a genus of *Gobiidæ*, from the coasts of the Indo-Pacific, remarkable for their prominent retractile eyes, which enable them to see in the air as well as in the water, and for their strong ventral and pectoral fins, by the aid of which they can hop freely over the ground, when they leave the water, as is their habit at ebb tide, to hunt small crustaceans. The species are few in number; but *P. koelreuteri* is one of the commonest fishes of the Indian Ocean.

PERIOSTEUM, a dense lining membrane covering the whole surface of bone, except the articulations, which have a thin cartilaginous layer. As long as a single portion of periosteum remains alive bone is capable of being reproduced.

PERIOSTITIS, inflammation of the periosteum, a painful ailment frequently brought on by sudden exposure to cold after being heated.

PERIPATETIC, the name given to the followers of the Aristotelian philosophy. Aristotle partly adopted the results of Plato, and made them available for the world. Both teachers admitted that science could only be formed from Universals, but Aristotle took the view afterward called Nominalist, and contended that such Universals were noth ing more than inductions from particular facts. He thus made experience the basis of all science. In the Middle Ages, Albertus Magnus (1193–1280) did much to spread the Peripatetic philosophy, as well as the ethical and physical writings of Aristotle, and his pupil, St. Thomas Aquinas (1227–1274), the greatest of the Scholastics, was much influenced by them. The study of the works of Aristotle was greatly revived in the 19th century, and those of St. Thomas Aquinas were specially recommended to clerical students by Pope Leo XIII.

PERIPATUS, the sole genus of the group *Peripatidea* or the order *Onycophora*. They are vermiform animals, indistinctly segmented, with soft integuments. On each side of the body there are a number of short legs, terminated by a rudimentary jointed part, and a pair of hooked claws. The head bears a pair of simple annulated antennæ, and a pair of simple eyes. They are viviparous, nocturnal in habit, and are found in decaying wood. Several species are known, from the West Indies, the Cape of Good Hope, South America, and New Zealand.

PERIPHERY. See CIRCUMFERENCE.

PERISCOPE, an instrument for observation from a concealed position. In its most elementary form it is a tube in each end of which are reflecting surfaces set parallel to each other at an angle of 45° with the axis of the tube. This form of periscope, with the addition of a simple lens, was much used for observation purposes in the trenches during the World War.

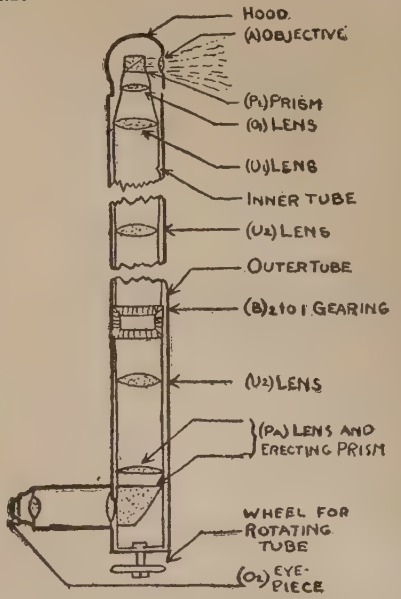


DIAGRAM OF PERISCOPE

The principle of the periscope of a submarine is essentially the same—reflecting prisms and several lenses are used, and a collecting eye piece is placed at the lower end. This type of periscope is protected by a casing tube and head. A system of gears is used to turn the inner tube, in order that it may be trained upon a desired point.

Although the periscope in some form

has been known for centuries, its development into an efficient instrument has been comparatively recent.

PERISSODACTYLA, in Owen's classification, a section of Ungulata. The hind feet are odd toed in all, and the fore feet in all but the *Tapiridæ* and the *Brontotheridæ*. Dorsolumbar vertebræ never less than 23. Femur with a third trochanter. Horns, if present, not paired, except in the extinct Diceratherium. Usually there is but one horn; if two are present, they are in the median line of the head, one behind the other, not supported by bony horn cores. The section is now usually divided into seven families, four extinct.

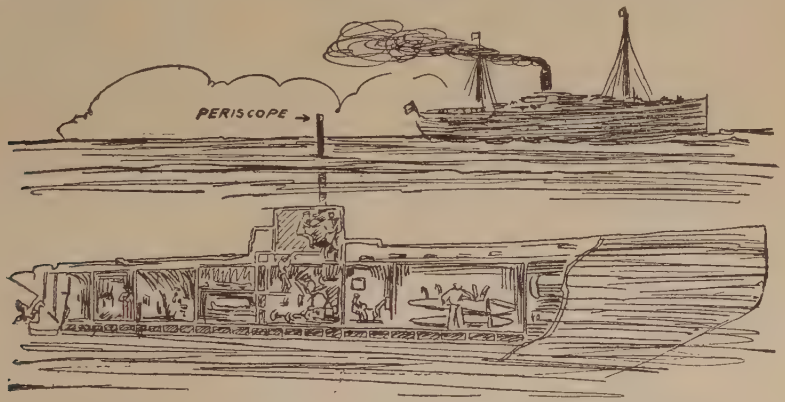


DIAGRAM OF SUBMARINE SHOWING POSITION OF PERISCOPE

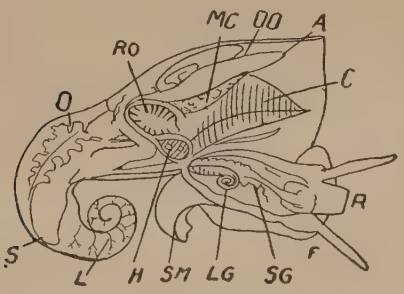
PERISTYLE, an open court within a house, having a colonnade around it, by which the principal apartments were reached; the exact reverse of the peripteros, though the same in character, the one being inside, the other outside a building.

PERITONEUM, one of the most difficult parts in the human anatomy for a teacher to explain intelligibly to his pupils, and the last that the student is able thoroughly to understand. From birth till death, the bowels are constantly moving and gliding over each other, in a worm-like perpetual motion, called peristaltic motion. It will be self-evident that this day and night friction of such delicate textures as those composing the integuments would, in the 70 years of man's life, wear out, or at least in time most seriously injure them. To prevent this friction, nature has provided the peritoneum, an immense shut-bag. The inside—that portion out of sight—presents, when cut open, a smooth, glairy surface, studded with innumerable vessels, always pouring out a thin, smooth fluid, like the liquid white of an egg, allowing the two sides, when rubbed together, to glide over each other, as if oiled, without check or the slightest friction. The outside of this is rough and granulated. The peculiarity of the inner and outer sides of this immense bag lies in this, that the surface of the first is close, smooth, moist, and shiny, and, however firmly pressed, can never grow together, or keep long in contact; while that of the other is rough, dry, and adheres firmly to all with which it comes in contact. This external side, then, adheres to the muscles of the abdomen, and to every portion of the intestines, but in such a manner that between every convolution, or twist of the bowels, a fold of peritoneum accompanies it, so that between the bowel above or below there is always the two glairy sides rubbing against each other, and allowing the intestines to glide about without let or hindrance, the bowels being always on the outside of the bag, but always gliding over the two inner sides. The peritoneum is a serous membrane, and, in the same way as it covers the bowels, lines and invests every organ in the abdominal and pelvic cavities.

PERITONITIS, inflammation of the peritoneum; it is exceedingly painful and dangerous, from its extent and connection with important organs. Peritonitis may exist either as an acute or chronic disease. In the former there is usually great pain and tenderness of the abdomen, accompanied with fever, and a frequent, small, and hard pulse. Sometimes, at first, the pain is confined to one spot, but it generally soon extends over the whole of the abdomen. It is very severe, and much increased by any motion, even coughing, sneezing, or drawing a long breath. Its causes are various, as

by cold, mechanical injuries of the peritoneum, the development of tumors, etc. Women in childbed are peculiarly liable to it. After the disease has continued for a certain time, it is attended with tension and swelling of the belly; and if not checked, it usually terminates in from 5 to 10 days.

PERIWINKLE (*Littorina*), a genus of marine Gasteropods, represented by several species on British coasts. The



PERIWINKLE

Anatomy of body removed from the shell; R, rostrum, SG, salivary gland; LG, lingual coil; S, stomach; L, liver; RO, renal organ; A, anus; H, heart; SM, shell muscle; MC, mucous gland; C, gill; O, ovary; OO, ovarian orifice; F, foot.

commonest, *L. littorea*, is abundant between tide marks on the rocks, and is often collected and used for food. It is boiled in its shell, extracted as eaten, and is very palatable. Periwinkles crawl about when under water, but usually remain passive when left uncovered by the tide. Without water they can survive for many hours, and they are also able to endure a considerable freshening of the salt water. They feed on sea weeds, and are often useful in keeping beds of young oysters from being smothered. Periwinkles drawn up from 70 to 80 fathoms were first in 1889 used as bait for cod fishing on the banks of Newfoundland. The edible species is oviparous, but in *L. rudis*, which is usually common nearer high water mark, the young are hatched and have a hard shell before they leave the mother. Species of *Littorina* occur on almost all coasts, and there are about 50 in all.

PERJURY, the taking of a wilful false oath or affirmation, by a witness lawfully required to depose the truth in a matter of some consequence to the point in question. A false oath, therefore, taken before no court, or before a court incompetent to try the issue in question, does not constitute the offense of perjury at common law. But many statutes in the United States, passed by the general government or the several States on the matter, provide that a false oath or declaration made on some specified occasions, or for some particular purposes, shall be considered to be perjury, and punishable accordingly. Perjury is a misdemeanor at common law, and by several statutes punishable by fine and imprisonment, and by penal servitude for a term not exceeding seven years.

PERKINS, GEORGE WALBRIDGE, American banker. Born in Chicago in 1862. After graduating from the public schools in Chicago he entered business in the office of the New York Life Insurance Co. He rose steadily in the offices of the company and finally became vice-president in 1903. From 1901 to 1910 he was a member of the firm of J. P. Morgan & Co. In the latter year, while retaining his position as director

GEORGE WALBRIDGE PERKINS

in many of the large corporations, he retired from active business and has given his time and money to many public enterprises, such as the Palisades Interstate Park Commission, the New York Scenic and Historic Preservation Society, etc.

PERKINS, JAMES BRECK, an American lawyer and historical writer; born in St. Croix Falls, Wis., Nov. 4, 1847. Congressman 1902-1905. His chief works are: "France under Mazarin" (1886); "France under the Regency" (1892); "France under Louis XV.," etc. He died Mar. 11, 1910.

PERLITE, a variety of obsidian with an enamel-like luster and a gray color. Structure, usually granular, fine to coarse-grained, occasionally spherulitic. Sub-translucent to opaque.

PERM, a city of Russia, the capital of the former government of the same name. Prior to the World War there were important manufactories of tanneries and the port had considerable trade. Pop. about 65,000.

PERMANGANATE, a compound of permanganic anhydride, Mn_2O_7, and a base. Potassic permanganate is used as a disinfectant, and as a chemical reagent.

PERMIAN PERIOD, the name given to the closing era of the Carboniferous age, which was a time of decline for Palæozoic life, and of transition toward a new phase of geological history. In the United States the Permian rocks are confined to the interior continental basin, and occur in the portion of it W. of the Mississippi, especially in Kansas. The rocks are limestones, sandstones, red, greenish, and gray marls or shales, gypsum beds and conglomerates, among which the limestones in some regions predominate. The Permian period was so called by Murchison, because he found them largely developed in that portion of Russia which composed the ancient kingdom of Permia, of which the actual government of Perm forms a part.

PERMUTATION, the act of exchanging one thing for another; mutual change; interchange; intermutation. Also in mathematics, change or combination of any number of quantities. The different arrangements which can be made of any number of given quantities, when a certain number, or the whole of them, are taken together; thus the permutations of *a*, *b*, and *c*, taken two together, are *ab*, *ac*, *ba*, *bc*, *ca*, and *cb*. The number of permutations of *n* things taken two together is $n\ (n-1)$; of *n* things taken three together, $n\ (n-1)\ (n-2)$, and so on.

PERNAMBUCO, a town in Brazil, capital of the province of the same name, on the E. coast. It consists of three distinct parts: Recife, occupying a small peninsula; São Antonio, on an island; and Boa Vista, on the mainland, the three parts being connected by iron bridges. Recife is the principal seat of business. In it are the custom house, the exchange, a marine arsenal, etc. San Antonio has broad streets and many fine houses, and contains the episcopal palace, the theater, the military arsenals, etc. Boa Vista is the fashionable residential quarter. The principal exports are sugar and cotton; and the chief imports Manchester goods and hardware. Pernambuco was founded by the Portuguese in the 16th century. From 1630 to 1654 it was in the hands of the Dutch, under whom it prospered greatly. It is now the third largest city in Brazil, and the second in commercial importance. Pop. about 220,000. The province has an area of 49,625 square miles. Pop. about 2,100,000. The principal cultivated crops are the sugar cane and cotton; the forests yielding valuable timber, including Brazil wood, often called Pernambuco wood.

PÉRONNE, a fortified town in France, on the Somme, 94 miles N. of Paris, notable only on account of being the center of heavy fighting during the World War, especially during the great German offensive in the spring of 1918. (See PICARDY, BATTLES OF.) Here, on March 24, 1918, the British were heavily attacked by the Germans and driven back. Though a failure in its main objective, the German offensive succeeded in gaining a considerable area of territory, in the form of a wide salient, of which Péronne was in the center.

PEROXIDE, a term applied in mineral chemistry to certain dioxides in which the second atom of oxygen is held in a state of weak combination, as in the case of barium peroxide, BaO_2. By the action of strong sulphuric acid, barium sulphate is formed and oxygen set free. In organic chemistry it applies to certain peroxides or organic radicals, produced by the action of barium peroxide on the anhydride of the radical. Acetic anhydride is by this means converted into peroxide of acetyl, $\left.\begin{matrix} C_2H_3O \\ C_2H_3O \end{matrix}\right\}O_2$.

PERPENDICULAR, in geometry, a line falling directly on another line, so as to make equal angles on each line. A straight line is said to be perpendicular to a curve, when it cuts the curve in a point where another straight line to which it is perpendicular makes a tangent with the curve. In this case the perpendicular is usually called a normal to the curve.

PERPENDICULAR STYLE, the third period of Pointed Architecture. It originated at the end of the 11th century, and continued till the close of the 16th, when it was succeeded by the Revived, or Debased Classic, known as the Elizabethan. It is also known as the Florid, from the multiplicity, profusion, and minuteness of ornamental detail, and its more general name, Perpendicular, is derived from the mullions of the windows and the divisions of ornamental panel work running in straight or pependicular lines, which was not the case in any earlier style. The pointed arches are constructed from almost every radius. The most common doorway is the depressed four-centered arch (almost peculiar to this style) within a square head, having generally a hood molding over, the spandrels being filled with quatrefoils, paneling, roses, foliage, small shields, or other sculptured ornaments. Fan-shaped roofs, ornamented with dependent pendants resembling stalactites, are also peculiar to the Perpendicular style. Richly decorated roof trusses, which are left clearly visible, are also of frequent occurrence. In these roofs the spaces between the highly ornamented and molded beam are filled with rich tracery.

PERPETUAL MOTION, a motion which, once generated by mechanical means, should have the power of perpetuating itself. A machine which, according to the hopes of its inventors, after it has once set in motion, will keep in motion without drawing on any external source of energy. As early as 1775 the Académie des Sciences of Paris placed the problem in the same category with the duplication of the cube and the quadrature of the circle, and refused to receive schemes claiming to have overcome the difficulty—in reality, to have performed the impossible. The overbalancing wheel was a favorite contrivance with the seekers after a perpetual motion. It appears as early as the 13th century.

PERPETUITY, uninterrupted or continued duration or succession; endless duration; continuance to eternity; something of which there will be no end; that which continues indefinitely. The number of years in which the simple interest of any sum invested in an annuity or annuities becomes equivalent to the principal; also, the amount which will purchase an annuity payable forever. In law, quality or class of an estate by which it becomes inalienable, either perpetually or for an indefinitely long period of time; also, the estate so perpetuated.

PERPIGNAN, a town of France, and a fortress of the first rank; in the department of Pyrénées-Orientales, on the river Têt, 7 miles from the Mediterranean, 40 S. of Narbonne, and 17 from the Spanish frontier. It commands the passes of the Eastern Pyrénées, and is defended on the S. by a citadel, which incloses the old castle of the Counts of Roussillon, and by a detached fort. The streets are narrow and the houses of semi-Moorish construction, and show evidences of Spanish influence. The cathedral (begun in 1324), the Moorish-Gothic cloth hall or bourse (1396), the town house (1692), the building of the former university (1349–French Revolution), the court house, and a college are the principal public buildings. Good red wine is made, sheep and silkworms are bred, vegetables and fruit grown, brandy distilled, cloth woven, and corks cut; and there is a good trade in wine, spirits, wool, cork bark, oil, cloth, and silk. As capital of the former county of Roussillon Perpignan was in the hands of the kings of Aragon from 1172 to its capture by France in 1475; it was restored to Spain in 1493; but Richelieu retook it in 1642, and France has possessed it ever since. Pop. (1911) 39,510.

PERRANZABULOE, a Cornish coast parish, 10 miles N. by W. of Truro. The rude little stone oratory (25 by 12½ feet) of St. Piran, who was sent to Cornwall by St. Patrick in the 5th century, had been buried in the sands for 1,000 years, when it was discovered in 1835; it is probably the earliest ecclesiastical structure in England. Perran Round is a circular inclosure, with seven rows of seats that could seat 2,000 spectators, in which miracle plays were performed of old.

PERRY, a city of Iowa, about 35 miles N. W. of Des Moines. It is on the Chicago, Milwaukee, and St. Paul and the Minneapolis and St. Louis railroads. It is the center of a rich agricultural district and has also important industries including the manufacturing of washing machines, cement blocks, etc. It is the seat of Jones College. Pop. (1910) 4,630; (1920) 5,642.

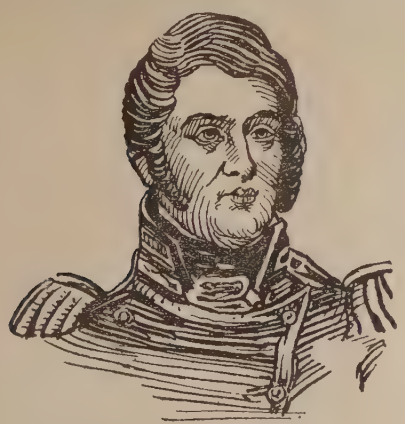
PERRY, BLISS, an American educator and editor; born in Williamstown, Mass., Nov. 25, 1860. He was Professor of Oratory and Æsthetic Criticism at Princeton University, resigning to become editor of the "Atlantic Monthly." He has published: "The Broughton House" (1890); "Salem Kittredge, and Other Stories" (1894); "The Plated City" (1895); "Walt Whitman" (1906); "The

American Mind" (1911); "Carlyle" (1915); "American Spirit in Literature" (1918).

PERRY, JAMES DE WOLF, JR., an American bishop, born in Germantown, Pa., in 1871. Graduated at the University of Pennsylvania in 1891. After studying theology at the Cambridge Theological School he became a deacon, in 1895, priest in the following year. For two years following he was pastor of Christ Church, Springfield, Mass., and was successively pastor of Christ Church, Fitchburg, Mass., and St. Paul's Church, New Haven, Conn. He remained in the latter position until 1911, when he was consecrated Bishop of Rhode Island. In 1898 to 1904 he was chaplain of the 6th Massachusetts Infantry.

PERRY, NORA, an American author; born in Dudley, Mass., in 1841. For many years she was a correspondent of the Chicago "Tribune" and the Providence "Journal." Early in her career she gained a reputation as a poet, but was more widely known as a writer of stories for girls. Her works include: "After the Ball, and Other Poems" (1875); "For a Woman" (1885), a novel; "New Songs and Ballads" (1886); "A Flock of Girls" (1887); "A Rosebud Garden of Girls" (1892); "Hope Benham" (1894). She died in 1896.

PERRY, OLIVER HAZARD, an American naval officer; born in South Kingston, R. I., Aug. 23, 1785; famous for his defeat of a British force on Lake Erie in 1813. Perry, who had nine



OLIVER HAZARD PERRY

vessels, with 54 guns and 492 officers and men, fought six vessels, with 63 guns and 502 officers and men, lost four-fifths of the crew of his flagship, and finally won a complete victory, which he announced in a brief dispatch: "We have met the enemy, and they are ours—two ships, two brigs, one schooner, and one sloop." Perry died of yellow fever in Trinidad, Aug. 23, 1819, and was buried in Newport, R. I., where there is a bronze statue (1885).

PERRY, ROLAND HENTON, sculptor and painter. He was born in New York in 1879, and studied painting and sculpture in Paris, and his work quickly won recognition. The "Fountain of Neptune" in front of the Congressional Library, Washington, is an example of his first plastic work, but this, and his "Siegfried," were progressively excelled by his later works, among them, "The Lion in Love," "Circe," the Langdon doors of the Buffalo Historical Society, the frieze in the lobby of the New Amsterdam Theater in New York, "Pennsylvania" on the capitol at Harrisburg. Sculpture has been his main work but his painting at Detroit "The Death of Sigurd" shows finish in that field also.

PERSECUTION, the act or practice of persecuting; specifically, the act of afflicting with suffering or loss of life or property for adherence to particular opinions, religious creed, political views, nationality, etc., either as a penalty or in order to compel the sufferers to renounce the principles in which they believe.

The word first became current in Christian circles in connection with 10 persecutions of Christians under the Roman emperors. The first was the persecution under Nero, A. D. 64; the second, under Domitian, A. D. 95; the third, under Trajan, A. D. 106; the fourth, under Marcus Aurelius, A. D. 166; the fifth, under Septimius Severus, A. D. 198; the sixth, under Maximinus, A. D. 235; the seventh, under Decius, A. D. 250; the eighth, under Valerian, A. D. 258; the ninth, under Aurelian, A. D. 275; and the tenth, under Diocletian, A. D. 303. The mediæval church persecuted all whom it considered heretics, and the Reformation in England everywhere had to struggle against persecution. When it became powerful enough, it also became intolerant to those who differed from it, passing and carrying out penal laws against Roman Catholics, dissenters, and unbelievers.

PERSEPHONE, in Greek mythology, the daughter of Zeus and Demeter (Ceres). While she was gathering flowers near Enna in Sicily Pluto carried her off to the infernal regions, with the consent of Zeus, and made her his wife, but in answer to the prayers of Demeter she was permitted to spend the spring and

summer of each year in the upper world. In Homer she bears the name of Persephoneia. The chief seats of the worship of Persephone were Attica and Sicily. In the festivals held in her honor in autumn the celebrants were dressed in mourning in token of lamentation for her being carried off by Pluto, while at the spring festivals they were clad in gay attire in token of joy at her return.

PERSEPOLIS, the Greek translation of the lost name of the capital of ancient Persia, was situated on the Araxes river,

A BAS-RELIEF AT PERSEPOLIS

to the E. of the Medus river, in the plain of Merdusht, about 35 miles to the N. E. of Shiraz, on the road to Ispahan. A number of most remarkable ruins is all that now remains of Persepolis. Darius Hystaspes, Xerxes, Artaxerxes, and other Archæmenides, each in his turn contributed toward its aggrandizement.

PERSEVERANCE, the Calvinistic doctrine that those who are elected to eternal life, justified, adopted, and sanctified, will never permanently lapse from grace or be finally lost. Called more fully the perseverance of the saints. It is founded on Matt. xxiv: 24, John x: 27–29; Rom. viii: 29–39; Phil. i: 6, etc.

PERSHING, JOHN JOSEPH, an American general. He was born in Lynn co., Mo., in 1860, and was graduated at the United States Military Academy, West Point, in 1886, as senior cadet captain, on which he received his commission as second lieutenant in the Sixth United States Cavalry, getting his first experience of warfare in the Apache Indian campaigns in Arizona and New Mexico. He was also named to command the Sioux Indian scouts in 1890-1891 Sioux campaign in Dakota. His next appointment was as military instructor in the University of Nebraska, after which he was transferred to the 10th Cavalry in 1892, continuing his lectures, when in 1896 he gained distinction in the Cree campaign, and in 1898 in the Santiago campaign. He organized the bureau of insular affairs in Cuba, and next saw service in the Philippine Islands, being active there at Mindanao in operations against the Moros. When the Russo-Japanese War broke out he went as United States military attaché to Japan, and was with the army of General Kuroki during the Manchurian campaign. He returned to the Philippines in 1906, as brigadier-general and governor of the

GENERAL JOHN J. PERSHING

Moro province, continuing his campaigns till they culminated in victory in June, 1913. He then was engaged in department work till the Mexican crisis of 1915, when he was put in command of the punitive expedition against Francisco Villa. It was in this year that he lost his wife and three children in a conflagration at the Presidio, San Francisco. In May, 1917, Pershing was made commander-in-chief of the American Expeditionary Forces destined for Europe and went ahead of the army in the following month. In October he was made full general, and following the appointment

of Foch as generalissimo of all the Allied forces, he placed the American army at his disposal. During the war he worked in close association with the French general, and on his return to the United States received a great popular welcome. Toward the end of the war French, Italian, British, and American honors were showered upon him. Sept. 4, 1919, confirmed by Senate as General of the Armies of the United States.

PERSIA (Persian Iran), an extensive country of Asia, bounded on the N. by the Caspian Sea, the Transcaspian and Transcaucasian provinces of Russia; S. by Persian Gulf and Indian Ocean; E. by Russian territory, Afghanistan and Baluchistan, and W. by Asiatic Turkey. Its length obliquely from N. W. to S. E. is 1,500 miles; area, about 628,000 square miles. Pop. about 10,000,000.

TEMPLE AT URUMIAH, PERSIA

Topography.—On the N. W. and S., several lofty mountain ranges—some of considerable length, others short and abrupt—intersect the land in many directions, the center of the country consisting in general of a vast plain or tableland. The lowest or most level portions of the country lie along the bed of the Tigris and the shore of the Persian Gulf. Persia possesses many extensive plains and barren deserts, and the interior is generally bare, bleak, and arid. The mountains appear to be a confused heap of hills piled upon hills, in grand but indefinite order; while each individual hill appears a mass of gray rock reared block on block, or starting in huge bowlders abruptly from the face of the plains or plateaux. The plains, again, are vast naked steppes, destitute of trees or foliage; and it is only on the margin of water courses, or the banks of rivers, that either villages or vegetation of any abundance are found. The provinces, however, along the S. and W. margin of the Caspian are an exception to the rest of the country, and present some of the most beautiful and fruitful pictures of richness and abundance to be found in Persia. It has been computed that barely a third of the entire kingdom is fit for cultivation; and, though husbandry is well attended to, and the advantages of copious irrigation are thoroughly understood, so little encouragement is given by the state to agriculture that but a small part of the capable soil is tilled. The most important rivers are the Aras, Murghab or Bendemir, Atrek, Sefid-Rud, and the Tigris. The lakes of most note are Urumiah, or Shalu, Bakhtegan, and Mahdigla; from these, and from minor streams and bodies of water, an elaborate system of irrigation is effected all over the cultivated grounds, while vast sub-

terranean aqueducts convey the water to more remote situations.

Productions and Climate.—The vegetable productions of Persia embrace all kinds of legumes and cereals, except rye, oats, and rice; barley and wheat are the most abundant crops. Drugs of various kinds are obtained, such as senna, rhubarb, gums, opium, etc.; as also oils, cotton, indigo, sugar, madder, dates, pistachio nuts, and tobacco; while in flowers, and the perfumes extracted from them, especially the attar of roses, no country in the world can compare with Persia for beauty, fragrance, and abundance. Silk is an important item; and plantations of mulberry trees of great extent are very numerous. Vast flocks of sheep and goats are pastured over the country, the property and wealth of the wandering tribes of the interior, the *Eelauts*, a kind of Bedouins, devoting themselves to pastoral habits. The animals for which Persia is famous are camels, horses, mules, oxen, asses, and buffalos. The mineral wealth consists of silver, copper, lead, iron, antimony, salt, precious stones—especially turquoise—bitumen, and springs of naphtha. There are also large, undeveloped fields of coal and petroleum. One of the features of Persia is the abundance of salt in the soil, and the large number of its salt lakes; about 30 pure salinas have no outlet; and one, the largest, Urumiah, is 280 miles in circumference, and, though supplied by 14 rivers, its water is so dense, bitter, and loaded with salt, that no fish can live in it. Another, called the Bakhtegan, is 42 miles long. Situated near the former are some remarkable ponds, whose waters are petrifying. The climate of Persia embraces the rigors experienced on the mountains of the snowy N., and the heat felt on the sandy plains of Africa. Cyrus the younger told Xenophon that his father's empire was so vast that in the N. the people perished of cold, and in the S. were suffocated with heat.

Manufactures.—The manufactures of Persia are numerous and important, and embrace all kinds of silk fabrics, satins, taffetas, textures of silk and cotton, silk and goat's hair, or silk and camel's hair; brocades, camel's hair shawls, gold tissues, gold velvet, camlets, carpets, cottons, leather, firearms, sword blades, saddlery and jewelry.

Commerce.—The imports of 1917-1918 amounted to £15,602,200, and the exports to £11,290,500. The chief imports were cotton, sugar, rice, manufactures of iron and steel, petroleum, and yarn. The chief exports were fruits, cotton, opium, animals, petroleum, and carpets. In 1917-1918 the industries suffered from drought and famine, which were followed by an epidemic of influenza, which greatly reduced the population. The harvest of 1919 was excellent and promised a revival of activity. Industry in general suffered by interruption of commerce with Russia, which before the World War had been large.

Transportation.—In August, 1919, the British Government signed an agreement with Persia providing for the construction of railways and other forms of transportation. There were in 1920 less than 100 miles of railway. Practically all the traffic is carried on by roads, and these for the most part are poor. There are about 6,500 miles of telegraph line.

Finance.—There are no available figures later than 1913-1914. At that time the revenue amounted to £1,480,778. The gross customs receipts in 1916-1917 were approximately £850,000.

Government.—Up to 1906 Persia was an absolute monarchy resembling in its form of government Turkey. The shah was the absolute ruler. In 1905 the people demanded representative government and in January, 1906, the shah gave his consent to the establishment of a national council. This, however, was never established and it ceased to exist as a legislative body in 1915. The government of the country is in the hands of a cabinet consisting of eight ministers. It is divided into 33 provinces, each of which is governed by a governor-general.

Language and History.—The Persian language is the most celebrated of all the Oriental tongues, for strength, copiousness, beauty, and melody, and is written from the right to the left. Persia is divided into 12 provinces, namely: Azerbaijan, Kurdistan, Luristan, and Khusistan, on the W.; Farsistan, Laristan, and Kirman, on the shores of the Persian Gulf, or S.; Irak-Ajemi and Khorassan, in the interior; and Ghilan, Mazanderan and Astrabad, in the N., or along the Caspian shores. The modern capital is Teheran. The earliest account we possess of Persia is from the Bible, from which we learn that, in the time of Abraham, 1921 B. C., that portion of modern Persia known as Elam, or Suisiana, southern Persia, was a powerful monarchy. But the Persians, as a nation, first rose into notice on the ruins of the great empires founded on the Euphrates. Babylon was taken by Cyrus, and his empire extended wider than any before established in the world. It comprised, on one side, the W. of India; on the other, Asia Minor, Syria, and Egypt; and was only bounded by the prodigies of valor with which the Greeks defended

their small territory. After a feeble struggle, it succumbed to the brave and disciplined armies of Alexander. It was then split into fragments by the decease of its founder; but Greeks and Greek sovereigns continued, during several centuries, to reign over Asia. About two centuries before Christ, Arsaces founded the monarchy of the Parthians; and in the 3d century arose the dynasty of the Sassanidæ, who restored the name, with the religion and laws, of ancient Persia. They were overthrown by the Mohammedan invaders, who suffered in their turn from the successive invasions by the descendants of Genghis, Timur, and by the Turks, who entirely changed the aspect of western Asia. At length, in 1501, a native dynasty again arose, under Ismail, who placed himself on the throne. His posterity having sunk into voluptuousness, Persia, in the beginning of the 18th century, was overrun by the Afghans, who carried fire and sword through its remotest extremities, and reduced its proudest capitals to ashes. The atrocities of the Afghans were avenged, and the independence of Persia vindicated by Nadir Shah, but though the victories of this daring chief threw a luster on his country, after his death it was almost torn to pieces by civil war, till the fortune of arms gave a decided superiority to Kereim, or Kurreem Khan. His death gave rise to another disputed succession, with civil wars as furious as before. At length, Aga Mahommed, a eunuch, raised himself, by crimes and daring, to the sovereignty, and not only swayed it during his lifetime, but founded a dynasty represented by Nassr-ed-Din, who was born in 1831, and ascended the throne in 1848. His son, Muzaffar-ed-Din, succeeded him in 1896. He died in 1907 and was succeeded by Mohammed Ali Mirza, his son. The people, dissatisfied with the incompetency and corruption of the government, demanded a constitution in 1906. The shah yielded and a national mejliss or parliament assembled on Oct. 7, 1906. Shortly after the shah abdicated and was succeeded by Mohammed Ali, his son. By the new constitution, parliament gained control of the finances of the kingdom. This was bitterly opposed by the shah and the party which supported him. In 1909 the shah compelled the cabinet to resign and the prime minister was exiled. Martial law was declared and the parliament was dissolved by a body of Cossacks sent by Russia to aid the shah. Civil war followed, in which the Nationalists were generally successful. The larger cities fell into their hands and the shah fled for safety to the Russian Legation. Parliament was recalled and the shah was deposed. He was succeeded in 1909 by his son, Mohammed Ahmed Mirza, a child of eleven. An attempt was made by the government to reform the finances by the employment of W. Morgan Shuster, an American, as Treasurer-General. He was given large powers and did efficient work, but was obliged to resign through the opposition of Russia. His dismissal was followed by disorders and uprisings which lasted until the outbreak of the World War. The Persian Government in November, 1914, declared its neutrality. In spite of this, however, both the Turks and Russians considered Persian territory adjacent to their own as a legitimate theater of war, and much of the fighting between the Turks and the Russians spread from the Caucasus over northwest Persia, and there were successive invasions by armies of both Russia and Turkey. The Persian Government was unable to defend its neutrality and the Khurdish tribesmen took advantage of this weakness. They overran northwest Persia and massacred thousands of Armenian and Nestorian Christians residing in the province of Azerbaijan. At the end of April, 1915, over 40,000 Armenians and other Christians had been forced to flee from this province. The Russians continued their advance into Persia toward the end of 1916, while the S. E. corner was occupied by Anglo-Egyptian forces under General Sykes. Throughout 1917 and 1918 the northern part of Persia was the scene of much fighting, in which Turkish, Russian, British, and Armenian forces took part. (See WORLD WAR.) Persia was represented at the Peace Conference and addressed a memorandum to the Powers declaring it to be the desire of Persia to be completely independent and self-governing, and asserted that the Anglo-Russian agreement of 1907 and 1916 had produced great harm, and requested that it be annulled. On Aug. 9, 1919, Great Britain and Persia signed an agreement whereby Great Britain undertook to maintain order and develop the resources of the country. The shah visited England, France, and other countries of Europe in 1919. Early in 1920 a British syndicate secured permission to develop railway lines in Persia. There were strong attempts on the part of the Bolshevik government of Russia to obtain political possession of Persia, in 1920, and the government urged Great Britain and the League of Nations to aid it in repelling the invasion of the Bolshevist troops who had seized the province of Ghilan, where they had established a Soviet republic. The Bolshevist forces retired, following the operations against General Wrangel in south Russia.

PERSIAN GULF, an arm of the Indian Ocean which penetrates between Arabia and Persia to the extent of 650 miles in a general N. W. direction. Its breadth varies from 55 miles at the mouth to 250 miles, and the area is estimated at 77,450 square miles, not including the islands, which are scattered over the W. half, or lie close inshore along the E. side. The chief of these islands are Ormuz, at the mouth; Kishm, 810 square miles in extent; and the Bahrein Islands. The Great Pearl Bank stretches along the W. side from Ras Hassan to nearly half way up the gulf. The coast is mostly formed of calcareous rocks. With the exception of the Shat-el-Arab, the Persian Gulf receives only insignificant streams. Its E. side presents abundance of good anchorage, either in the numerous bays or in the lee of islands. The greater portion of its S. shores now belongs to the Imam of Muscat, while the whole of the N. shore belongs to Persia. The order of the periodic currents in this gulf is precisely the reverse of that of the Red Sea currents, as they ascend from May to October, and descend from October to May. The greatest depth does not exceed 50 fathoms.

The submarine telegraph cables belonging to the government of India, and forming part of the system of the Indo-European Telegraph, pass through the whole length of the Persian Gulf. The pearl fisheries employed before the World War 70,000 men and 6,000 barks.

PERSIAN POWDER, a preparation made from the flowers of *Pyrethrum corneum* or *roseum*, and reduced to the form of powder. It is used as an insecticide.

PERSIMMON, or **PERSIMON**, *Diospyros virginiana*, a tree 60 feet or more in height, with ovate, oblong, taper-pointed, shining leaves, pale yellow flowers, and an orange-colored succulent fruit an inch or more in diameter; very astringent when green, but eatable when bletted. It grows plentifully in the Southern and South Atlantic States. The fruit is brewed into beer, and yields an ardent spirit on distillation.

PERSONAL EQUATION, the correction of personal differences between particular individuals as to exactness in observations with astronomical instruments.

PERSONALTY, or **PERSONAL PROPERTY**, movables; chattels; things belonging to the person, as money, jewels, furniture, etc., as distinguished from real estate in lands and houses.

PERSONIFICATION, the act of personifying, an embodiment, an impersonation. In rhetoric, a figure of speech, or a species of metaphor which consists in representing inanimate objects or abstract notions as endued with life and action, or possessing the attributes of living beings; prosopopœia; as, "Confusion heard his voice."

PERSPECTIVE, the science of representing appearances, and as such is opposed to geometry, which is the science of representing facts. It is founded upon such rules as can be deduced from the facts which are discovered by looking at objects through a sheet of glass or other transparent medium placed upright between the object and the observer. It is found when objects are so looked at that their apparent form is very different from their real one, both as regards shape and distinctness. The portion of the subject which deals with the changes in form is absolutely scientific; it is called linear perspective. The changes in distinctness are effected by distance and atmosphere, and differ constantly with different conditions of light and atmosphere. It is the purely artistic side of the science which is called aërial perspective, and success in its application depends on the individual ability of the artist. The chief point with which linear perspective has to deal is the apparent diminution in size of objects as they recede from the spectator. A practical knowledge of the science is absolutely a necessity for a successful artist.

A kind of painting designed expressly to deceive the sight by representing the continuation of an alley, a building, a landscape, or the like. Oblique (or angular) perspective, where the plane of the picture is supposed to be at an angle to the side of the principal object in the picture, as, for instance, a building. Parallel perspective, where the plane of the picture is parallel to the side of the principal object in the picture. Perspective plane, the surface on which the objects are delineated, or the picture drawn. It is supposed to be placed vertically between the eye of the spectator and the object. Also termed the plane of projection, or the plane of the picture.

PERSPECTOGRAPH, an instrument for the mechanical drawing of objects in perspective. The object is placed in front of the eye, which is applied to a small hole. A movable hinged bar is so adjusted as to bring a point between the eye and a certain part of the object. The bar is then folded down and the mark transferred to the paper. A series of such marks affords data for the drawing of the object.

PERSPIRATION, watery matter "breathed out," or made to expire from the system by means of the pores in the skin. The quantity varies greatly, and is affected by the amount of heat or dryness in the atmosphere, by the fluid drunk, by the exercise taken, by the relative activity of the kidneys, by medicine, etc. Besides keeping the skin in a healthy, moist condition, and acting as a refrigerator, perspiration takes its share in carrying off superfluous or noxious matter from the system. If stopped, morbid consequences are sure, sooner or later, to ensue.

The horse perspires freely all over the body; the pig does so on the snout; the cat chiefly on the soles of the feet; the dog from the same part, but not to the same extent. Rabbits, and the rodentia generally, appear not to sweat at all. It is used also of the transudation of water through pores of plants. According to Hales, the perspiration of plants is proportionately 17 times as copious as that of animals.

PERTH, a city and royal and parliamentary burgh of Scotland, capital of the county of the same name, on the right bank of the Tay, and at the common junction of railways from Dundee, Aberdeen, Glasgow, Edinburgh, and Inverness. The North and South Inches, two fine public parks, and a fine bridge of nine arches lead to the suburb of Bridgend. Perth has many handsome public and private buildings. St. John's Church, a Gothic building partly ancient; the Episcopal cathedral, the county buildings, the municipal buildings, the penitentiary, and the railway station, the largest in Scotland. Perth is celebrated for its bleachfields and dye works. It manufactures cotton goods, ginghams, winceys, plaids, table linen, carriages, castings, etc. The river is navigable to the city for small vessels. Perth is generally supposed to be of Roman origin. Its earliest known charter is dated 1106; but it was first erected into a royal burgh in 1210 by William the Lion. Till the death of James I., in 1437, it was the capital of Scotland. Pop. (1918) 119,300.

PERTH, the capital of Western Australia, occupies a picturesque site on the N. bank of the Swan river, 12 miles from Fremantle, its port, at the mouth of the river. Perth is the headquarters of banking for the colony, and the center of the principal railway lines, including the Great Southern railway to Albany. Pop. (1917) 130,000.

PERTH, THE FIVE ARTICLES OF, a measure passed in a General Assembly of the Church of Scotland, convened at Perth by the order of James VI. in 1618. The first of these articles required communicants to receive the elements kneeling; the second permitted the dispensation of the communion privately in case of sickness; the third allowed private baptism on sufficient cause being shown; the fourth required that children of eight years should be confirmed by the bishop; and the fifth enjoined the observance of Christmas, Good Friday, Easter, Ascension, and Whitsunday. These articles were ratified by the Estates in 1621, but in the Assembly held at Glasgow in 1638 the assembly of Perth was declared to be unlawful and null, and the Five Articles were formally condemned.

PERTH AMBOY, a city and port of entry in Middlesex co., N. J.; at the head of Raritan Bay and the mouth of Raritan river, and on the Staten Island Rapid Transit, the Central of New Jersey, the Pennsylvania, and the Lehigh Valley railroads; 27 miles S. W. of New York; opposite the S. end of Staten Island. Here are a high school, Old Ministers' Home (Pres.), public library, waterworks, electric lights, several banks, and a number of daily and weekly newspapers. It has manufactories of cork, stoneware pottery, firebrick, chemicals, oil, terra cotta, hollow brick and emery. Perth Amboy was settled about 1680 by a colony from Scotland. It received a city charter in 1718. William Franklin, the last British governor of New Jersey, was captured here in 1776. Pop. (1910) 32,121; (1920) 41,707.

PERTHSHIRE, an inland county of Scotland, mostly in the highlands. The Grampian mountains traverse it, Ben Lawers reaching a height of 3,984 feet, and the lakes are numerous. The rivers Forth and Tay run through scenes among the most romantic in Scotland. There is much quarrying, and in the valleys agricultural crops are plentiful. Dairy farming, sheep breeding and weaving are among the industries, but much of the land is given over to deer preserves. Capital, Perth. Pop. about 125,000.

PERTINAX, PUBLIUS HELVIUS, a Roman emperor; born in A. D. 126, the son of a freedman. He distinguished himself in the army, and attracted the attention of Marcus Aurelius, who elevated him to the consulate in 179. During the reign of Commodus, Pertinax was employed in Britain and Africa, and finally made prefect of Rome. After the murder of Commodus he was proclaimed emperor in 193, but in three months was murdered by the prætorian guards.

PERTURBATION, any disturbance or irregularity in the movement of a planet in its orbit. Every heavenly body, by the law of gravitation, possesses an attractive power over every other one. When, therefore, the orbits of any two approach, each causes a perturbation in the movement of the other. Magnetic perturbation, irregular declination of the magnetic needle. This may be produced by earthquakes, by volcanic eruption, by the aurora borealis, etc.

PERU, a maritime republic of South America, bounded on the N. by Ecuador, on the W. by the Pacific, on the S. and S. E. by Bolivia and Chile, and on the E. by Brazil; area, 695,720 square miles; pop. (1910) 4,500,000; (1920) 5,000,000; capital, Lima.

Topography.—The general outline resembles a triangle, the base of which is formed by the boundary line between Peru and Ecuador on the N. On the E. side of the Andes, and between the Amazon and the Purus, there is a wide and unexplored expanse of country, upon which both Peru and Brazil have claims, though the boundary is now generally regarded as marked by the Rio Javary. The country is 1,100 miles in length, 780 miles in extreme width along the N. boundary, but it is little more than 50 miles wide in the extreme S. The islands on the Peruvian coast, though valuable, are extremely few in number, and small in extent. In the N. are the Lobos (*i. e.*, "Seal") Islands, forming a group of three, and so called from the seals which frequent them. The largest of them, Lobos de Tierra, is 5 miles long by two miles wide, and the others, lying 30 miles S. W., are much smaller. On their E. sides they are covered by guano, and the quantity on the whole group, when it began to be exported from them, was stated to be 4,000,000 tons. The islands of Macabi and Guanope, near the Lobos, were originally supposed to contain 2,280,000 tons of guano; but the guano exported has very greatly exceeded that amount, and it has been calculated that there are still 750,000 tons of guano on the former and 500,000 tons on the latter.

Physical Features.—The surface of Peru is divided into three distinct and well defined tracts or belts, the climates of which are of every variety, from torrid heat to Arctic cold, and the productions of which range from the stunted herbage of the high mountain slopes to the oranges and citrons, the sugar canes and cottons of the luxuriant tropical valleys. These three regions are the Coast, the Sierra, and the Montana. The Sierra embraces all the mountainous region between the W. base of the maritime cordillera and the E. base of the Andes, or the East Cordillera. These ranges are, in this country, about 100 miles apart on an average, and have been estimated to cover an area of 200,000 square miles. Transverse branches connect the one range with the other, and high plateaus, fertile plains, and deep tropical valleys lie between the lofty outer barriers. The mountain chains which girdle the plain of Titicaca trend toward the N. W., and form what is called the Knot of Cuzco; the Knot comprises six minor mountain chains, and has an area thrice larger than that of Switzerland. Here the valleys enjoy an Indian climate, and are rich in tropical productions; to the N. and E. of the Knot extend luxuriant forests, while the numberless mountain slopes are covered with waving crops of wheat, barley, and other cereals, and with potatoes; and higher up extend rich pasture lands, where huge herds of vicunas and pacas feed. The valley of the Apurimac is 30 miles in average width, and extends N. W. for about 300 miles. This valley is the most populous region of Peru. From Cuzco proceed two chains toward the N. W.; they unite again in the Knot of Pasco. This Knot contains the table-land of Bombon, 12,300 feet above the sea-level, as well as other table-lands at a height of 14,000 feet, the highest in the Andes; otherwise, however, the physical features of the country resemble those of the vicinity of Cuzco. The valley of the river Maranon, which is upward of 300 miles in length, is narrow, deep, and nearer the equator than any other valley of the Sierra, and consequently it is the hottest portion of this region, and its vegetation is thoroughly tropical in character. The conformation of the surface of the Sierra is of the most wonderful description.

After the table-lands of Tibet, those of the Peruvian Andes are the highest in the world; but, unlike those of Tibet, the table-lands of Peru are the seat of a comparatively high civilization, and are studded over with towns and villages, perched on heights exceeding in elevation the summits of the Jungfrau and the Matterhorn. Nor are such towns the mere eyries of miners who are tempted to ascend thus high in search of the precious metals; for, even at this elevation, the climate is pleasant, and wheat, maize, barley, rye, and potatoes thrive well. The city of Cuzco, situated in a region of rare beauty, and enjoying a temperate climate, is 11,380 feet above sea-level, or 2,000 feet higher than the Great St. Bernard. The climate of the Sierra, however, is not always so delightful. In general terms it may be described as mild and variable, with moderate rains. In

e district of Paucartambo rain falls 0 days in the year. A country, how-er, of such an uneven surface, of snow-vered peaks and tropical valleys, em-aces every variety of climate. The ghest peaks of the country reach to up-ard of 22,000 feet, and many aks in both ranges are from ,000 to 20,000 feet high. In the West ordillera and in the S. of the country e four volcanoes—Candarave, Ubinas, mate, and Arequipa. The hydrog-phy of Peru may be said to be divided to three systems—those of Lake Titi-ca, the Pacific, and the Amazon. The reams that flow into Lake Titicaca are w and inconsiderable. The rivers hich, having their sources in the West ordillera, flow W. into the Pacific, are) in number.

Commerce.—The sugar production reatly increased following the outbreak f the World War. It rose from 185,000 ns in 1914 to over 820,000 tons in 916-1917. In 1919 the acreage of sugar ane was estimated at over 1,000,000 and forts were being made to increase ne area. The total imports for 918 amounted to £9,705,113, and ne exports to £19,972,595. The chief nports were coal, textile bags, heat, lumber, and industrial oils. he chief exports were sugar, cot-on, copper, petroleum and wool. In 918 395 vessels of 790,133 tons entered n the foreign trade at Callao and 364 essels of 717,340 tons cleared.

Transportation.—The total length of ailways in Peru was 1,889 miles. Of hese, 1,358 miles were state railways nder the control of the Peruvian Cor-oration. They include the Peruvian entral, from Callao and Lima to Huan-ayo; the Southern Railway of Peru, rom Mollendo to Puno; the Paita to iura Railway; and the Pacasmayo to uadalupe Railway. There were about 74 telegraph offices, with about 8,000 iles of line. Three submarine tele-raph cables connect Peru and Chile, nd one connects Peru and the repub-ics to the north. There is a telephone ystem with about 3,000 miles of wire. n 1919 there were 19 wireless stations.

Education.—Elementary education is ompulsory, but the law is loosely en-orced. In 1919 there were 2,880 pri-nary schools with 195,689 pupils and ,284 teachers. There were about 300 upils in the normal schools and about ,000 in the government high schools. he high schools are maintained by the overnments in the capitals of the differ-nt departments. There is a central niversity at Lima called the University f San Marcos. It has about 1,500 stu-lents. There is also in Lima a school of mines and civil engineering, a national agricultural school, and a school of arts and trades.

Finances.—The total revenue in 1919 was £2,972,997, and the expenditure £2,680,767. The total debt on Jan. 1, 1919, was £5,802,144.

Army and Navy.—Military service is compulsory and universal. The peace strength of the army is 11,000. The country is divided into 5 military districts, each furnishing a complete division. Military instruction is given in the military schools and in special schools. The navy consists of 6 vessels; 3 cruisers, 2 submarines, and one submarine destroyer.

Government.—The constitution was amended in 1919. The republic is divided into departments and into provinces. The legislative power is vested in a Senate and a House of Representatives. The former is composed of deputies from the provinces. The executive power is in the hands of a president, and there are two vice-presidents who take the place of the president only in case of his death or incapacity. There is a council of State consisting of 6 members, selected by the ministers of State, to be confirmed by the Senate. There are three regional legislatures, northern, central, and southern. These have authority to pass legislation for local matters, which is reviewed by the Central Congress at Lima. The Central Congress is elected every 5 years. Congress is elected for 5 years as well as the president. The Senate consists of 35 members and the Chamber of Deputies of 110. The president is elected by a popular vote and only in the case of his death can the Congress elect.

History.—Peru, the origin of whose name is unknown, is now passing through its third historical era, and is manifesting its third phase of civilization. The present era may be said to date from the conquest of the country by the Spaniards in the early part of the 16th century; the middle era embraces the rule of the Incas; and the earliest era, about which exceedingly little is known, is that of pre-Incarial period of unknown duration, during which a nation, or nations, living in large cities flourished in the country, and had a civilization, a language, and a religion different, and perhaps in some cases even more advanced, than those of the Incas, who succeeded them and overran their territories. Regarding the origin of the Incas nothing definite can be said. There are no authorities on the subject save the traditions of the Indians, and these, besides being outrageously fabulous in character, are also conflicting. It

appears, however, from all the traditions, that Manco, the first Inca, first appeared on the shores of Lake Titicaca, with his wife, Mama Ocilo. He announced that he and his wife were children of the sun, and were sent by the glorious Inti (the sun) to instruct the simple tribes. He is said to have carried with him a golden wedge, or, as it is sometimes called, a wand. Wherever this wedge, on being struck on the ground, should sink into the earth and disappear forever, there it was decreed Manco should build his capital. Marching N. he came to the plain of Cuzco, where the wedge disappeared. Here he founded the city of Cuzco, became the first Inca (a name said to be derived from the Peruvian word for the sun), and founded the Peruvian race, properly so called. The Peruvian system of agriculture was brought to its highest perfection only by the prodigious labor of several centuries. Not only was the fertile soil cultivated with the utmost care, but the sandy wastes of the coast, unvisited by any rains, and but scantily watered by brooks, were rendered productive by means of an artificial system of irrigation, the most stupendous, perhaps, that the world has ever seen.

Water was collected in lakes among the mountains, led down the slopes and through the sands of the coast, apparently doomed to sterility, by canals and subterranean passages constructed on a vast scale, and the ruins of which, to be seen at the present day, attest the industry, ingenuity, and admirable patience of the Peruvians. The aqueducts, which were sometimes between 400 and 500 miles in length, were in some cases tunneled through massive rocks and carried across rivers and marshes. They were constructed of large slabs of freestone, fitting so closely as to require no cement, and answering perfectly the purpose for which they were intended, for the sandy wastes were converted into productive fields and rich pasture lands, and the coast teemed with industrious inhabitants. In the valley of Santa there were once 700,000 inhabitants; there are now only 12,000; in that of Ancullama there were 30,000 individuals; there are now only 425. The edifices of Incarial times are oblong in shape and cyclopean in construction. The materials used were granite, porphyry, and other varieties of stone; but in the more rainless regions sun-dried bricks were also much used.

The religion of the Peruvians, in the latter ages of the empire, was far in advance of that of most barbarous nations. They believed in a Great Spirit, the Creator of the universe, who, being a spirit, could not be represented by any image or symbol, nor be made to dwell in a temple made with hands. They also believed in the existence of the soul hereafter, and in the resurrection of the body. The after life they considered to be a condition of ease and tranquility for the good, and a continual wearisome labor, extending over ages for the wicked. But while they believed in the Creator of the world, they also believed in other deities, who were of some subordinate rank to the Great Spirit. Of these secondary gods the sun was the chief. They reverenced the sun as the source of their royal dynasty; and everywhere throughout the land altars smoked with offerings burned in his worship.

The modern history of Peru has been in general one of peaceful development. It was the last of the Spanish South American possessions to become independent. Independence was obtained in 1821, and the protectorate was assumed by General San Martin. By the spring of 1822 he had compelled the surrender of the last large body of Spanish troops. The government was formed in 1823, with José de la Riva Aguero as first president. He was deposed in 1823, through the influence of Bolivar, who secured possession of the country and was appointed supreme dictator in 1824. Fighting with the Royalists continued during that year. In these the patriots were successful. Bolivar resigned in 1825, but was reappointed and came into control of the government in 1827, when he returned to Colombia. A constitution was adopted in 1828. There were no important political developments until 1865, when an alliance against Spain was concluded with Chile, Ecuador, and Bolivia. The Spanish fleet bombarded Callao in 1866, but was compelled to withdraw. In 1869 Peru, with Bolivia, became allied in war against Chile. In this the Chileans were successful, and Lima and other cities were captured. A treaty of peace was concluded on Oct. 20, 1883, by the terms of which Peru annexed to Chile the province of Tarapaca, and the territories of Tacna and Arica for a term of 10 years. The people of these territories were to decide by popular vote whether to return to Peru or remain with Chile. The question has never been settled between the two countries. The recovery from the war was slow, but the financial conditions gradually readjusted themselves. During the years following there were several civil struggles, which, however, did not obtain importance. In 1912 Guillermo Billinghurst became president. His drastic efforts to reform corrupt political practices and his friendly attitude toward Chile brought about a revolt which resulted in his overthrow and exile in 1914. The outbreak of the World

War produced serious economic disturbances. The government resorted to the issuing of paper money, which caused further unsettled financial conditions. José Pardo was elected president in 1914. In 1915 Congress passed a constitutional amendment guaranteeing religious liberty. Neutrality was preserved in the World War until Oct. 6, 1917, when diplomatic relations with Germany were severed. The Germans made unsuccessful efforts to blow up interned steamers at Callao. In May 18, 1918, Augusto B. Leguia was elected president. A national assembly was called at Lima in the same year and fundamental changes in the constitution were adopted. In August, 1920, 4 American naval officers, at the request of the Peruvian Government, began the reorganization of the Peruvian navy, and took charge of the Peruvian Naval Academy. Peru also requested the United States to send 30 American educators; 15 to fill administrative and university positions and 15 for secondary school work.

PERU, a city in La Salle co., Ill.; at the head of navigation on the Illinois river, and on the Chicago, Rock Island and Pacific, Chicago, Burlington and Quincy, and the Chicago, Ottawa and Peoria railroads; 100 miles S. W. of Chicago. Here are St. Mary's Hospital, high school, public library, street railroad and electric light plants, waterworks, National and State banks, and several weekly newspapers. It has grain elevators, rolling mills, and manufactories of clocks, zinc, plows, sulphuric acid, brick, tile, sash doors, blinds, and wheels. Pop. (1910) 7,984; (1920) 8,869.

PERU, a city and county-seat of Miami co., Ind.; on the Wabash river, and on the Lake Erie and Western, the Wabash, and the Chesapeake and Ohio railroads; 75 miles N. of Indianapolis. Here are a public library, City Hospital, waterworks, electric lights, National and State banks, and several daily and weekly newspapers. It has railroad shops, and manufactories of flax, carriages, baskets, foundry products, glass, furniture, flour, woolen goods, carbon, etc. Pop. (1910) 10,910; (1920) 12,410.

PERUGIA, ancient Perusia, a town of central Italy, capital of the province of Umbria, 84 miles N. of Rome. It is beautifully situated on an eminence above the Tiber, has irregular but spacious streets, and is surrounded by old walls. It is rich in art and literary treasures, and has many remarkable buildings, including a Gothic cathedral of the 15th century, a number of churches and monasteries, a town hall (Italian Gothic, begun 1281), and a university, founded in 1307. The manufactures, not of much consequence, consist of velvet, silk stuffs, etc. Perugia was an old Etruscan city, and was conquered by Rome in 310 B. C. Pop. about 70,000. Pop. department, about 715,000.

PERUGIA, LAGO DI, or LAGO TRASIMENO, a lake in Italy, 9 miles W. of Perugia, about 8 miles long, varying in breadth from 7 miles to 4 miles, surrounded with olive plantations. It contains three islands, and abounds in fish. It has no visible outlet.

PERUGINO, PIETRO, an Italian painter; born in Città della Pieve, about 1446. His real name was Pietro Vanucci, but becoming a citizen of Perugia, he acquired the name by which he is

PIETRO PERUGINO

best known. He was employed for 10 years in the Sistine Chapel and the Stanze of the Vatican, and on his return to Perugia opened a school, and had Raphael among his pupils. Perugino was a sordid and eccentric man, and in his latter years produced many works, unworthy of him, for gain. His best work is the "Pietà," in the Pitti Palace. Among his best works are an "Ascension," at Lyons; the "Infant Christ Adored by the Virgin," at Rome; "Madonna Enthroned," at Bologna; and the fresco of the "Baptism" in the Sistine Chapel. He died in 1524.

PERUVIAN BALSAM, in botany and commerce, the balsam flowing from incisions in the trunk of *Myroxylon pereiræ*. It is a thick, viscid, almost opaque, balsam, like molasses, with a reddish hue, and translucent when in thin layers; its odor fragrant, its taste acrid, but aromatic. It is brought from San

Salvador, in South America. In pharmacy, is used as a stimulant and expectorant in chronic bronchitis, rheumatism, also to arrest excessive discharges from the urethra, and as an external application to stimulate bedsores and ulcers.

PERUVIAN BARK. See BARK, PERUVIAN.

PESARO, ancient Pisaurum, a town of Italy, on the right bank of the Foglia, here crossed by a bridge of Trajan's age, 1 mile from the Adriatic and 37 miles N. W. of Ancona. Its streets are broad, and adorned with palaces and churches, and the town is surrounded with walls and defended by a citadel (1474) and a fort. It is a bishop's seat; there are two cathedrals, new and old. Silks, pottery, iron, and leather are manufactured; and trade is carried on in wine, olive oil, and fruits. The city is associated with the name of Tasso, some of his MSS. being preserved in one of the town museums; it is also the birthplace of Rossini. Made a Roman colony in 184 B. C., it was destroyed by the Goths; then, having been rebuilt by Belisarius, it became one of the Pentapolis. From 755 to 1285 it belonged to the Popes, then to the Malatestas till 1445, then to the Sforzas and Delle Roveres, in 1631 again to the Popes, and finally in 1860 to Italy. Pop. of town (1915) 28,483. Of the department of Pesaro and Urbine, 270,696.

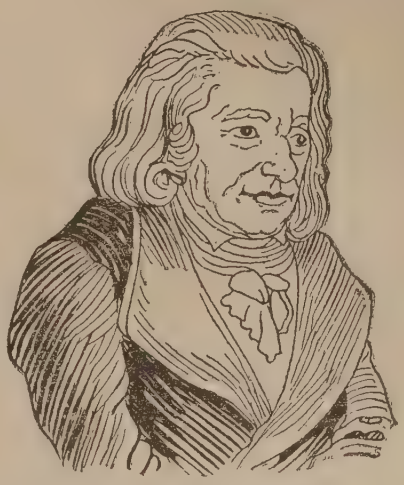
PESCHIERA, a fortress of Italy, a member of the Quadrilateral, stands partly on an island in the Mincio and partly on the right bank of that river, at its outlet from the Lake of Garda. Besides a strong citadel and an arsenal, there is a fortified camp. The fortress has played a prominent part in warlike events, especially after the Napoleonic wars began down to 1859.

PESHAWAR, or **PESHAWUR**, a town of India, 10½ miles from the entrance of the Khyber Pass, 190 E. by S. of Kabul, and 276 N. W. of Lahore. Though a frontier town and occupying a strategic position of the utmost importance, its only defenses are a mud wall and a small fort; but 2 miles W. of the city are the cantonments, with a garrison of six regiments and a battery of Royal Artillery. Peshawar is the seat of extensive commerce between Afghanistan and India; gold, silver, lace, hides (from Bokhara), horses, mules, fruits, woolen and skin coats (from Kabul) being exchanged for tea, English piece-goods, wheat, salt, rice, butter, oil, and sugar.

PESO, a silver coin and money of account used in Mexico and other parts of Spanish America, and often considered equivalent to a dollar.

PESSIMISM, that mental attitude which induces one to give preponderating importance to the evils and sorrows of existence; the habit of taking a gloomy and desponding view of things. Also the name given to the system of philosophy denounced by Schopenhauer (1788–1860) in "The World as Will and Idea" (of which the first volume was published in 1819, and the second some 25 years after), and by Von Hartman in his "Philosophy of the Unconscious" (1860), It was at the beginning of the 19th century that pessimism began to create a literature of its own. As examples may be cited Byron's "Euthanasia" and Heine's "Fragen." The adherents of this philosophy have for the most part belonged to the German races, Leopardi (1798–1837) being the sole Latin writer of note who has advocated pessimist theories.

PESTALOZZI, JOHANN HEINRICH, a Swiss philanthropist and educational reformer; born in 1746; first studied theology, then law. Afterward he devoted his time and substance to the children of paupers, whom he collected in large numbers in his own house, and this good work he carried on for over 20 years without outside aid or even sympathy. The want of means at last compelled him



JOHANN PESTALOZZI

to abandon his gratuitous institution, and to seek pupils who could pay for their maintenance and instruction. He opened a school in the Castle of Yverdun (canton Vaud), which the government had placed at his disposal. His novel "Lienhardt and Gertrud" (1781–1789), exerted a powerful moral influence, while his educational treatises laid the foundation for the more rational system of elementary instruction which now ob-

tains in Europe. Pestalozzi's method was that of communicating all instruction by direct appeal to the senses and the understanding, selecting the subjects of study in such a way that each step should best aid the further progress of the pupil. He died in 1827.

PESTH. See BUDAPEST.

PÉTAIN, MARSHAL HENRI PHILIPPE, a French general, born 1856; educated in Saint Cyr Military Academy, and Ecole Superieure de Guerre. Entering the army, he was rapidly promoted on account of his remarkable capacity for training cadets. In 1901 he was appointed to the faculty of the Ecole Superieure de Guerre. When the war broke out, in 1914, he was a colonel, and as such, was in command of a force at Charleroi, in Belgium, where he distinguished himself by holding back a vastly superior force of Germans. His skillful retreat on this occasion lead to his being given command of a division with which he participated in the first battle of the Marne. In May,

MARSHAL HENRI PÉTAIN

1915, in the Artois sector, he captured over 10,000 Germans and a corresponding amount of war material. In the early part of 1916, he was placed in command of the troops defending Verdun, 4 days after the German attack had begun. At that moment, and at that point, Germany made her supreme effort. General Pétain met the Germans with a counter-attack which drove them back and defeated them decisively. In recognition of this deed, he was made a marshal of France. In April, 1917, he became Chief of Staff, and a month later became French Commander-in-Chief, which position he held until the unification of all Allied forces under General Foch, in April, 1918, when he became a member of the General Staff. He visited the United States in 1920.

PETAL, in botany, one of the divisions of a corolla consisting of several distinct pieces. It is a modification of a leaf. It is generally larger than the calyx, and, unlike it, is as a rule brightly colored, *i. e.*, white, red, blue, yellow, or some of the hues produced by their intermixture. Sometimes the margins of the petals unite.

PETALITE, a monoclinic mineral, rarely occurring in crystals, but mostly in cleavable masses. The crystallized form is the castorite. Found on the Isle of Utö, Sweden, and at a few other localities. Related to spodumene.

PETALUMA, a city of California in Sonoma co. It is on the Petaluma river, the Northwestern Pacific and the Petaluma and Santa Rosa railroads. The city is an important agricultural community, and the raising of poultry is one of the chief industries. There are manufactories of silk, flour, machine shops and foundries, shoes, gas engines, etc. Pop. (1910) 5,880; (1920) 6,226.

PETARD, a machine formerly used for blowing open gates or barriers in fortifications. It was bell shaped, charged with powder, and fired by a fuse. The mouth of the machine was placed against the obstacle, and kept in place by struts or by being hung on a hook driven into the woodwork.

PETCHORA, a large river in the N. of European Russia, rises on the W. slope of the Urals, flows N. through the E. parts of the governments of Vologda and Archangel, then S. E. for about 150 miles, and finally sweeping toward the N., and expanding into an estuary 30 miles wide and full of islands, falls into the Arctic Ocean, after a course of over 1,000 miles. It is navigable by boats for upward of 700 miles. The country through which the river flows is thinly peopled, and quite uncultivated.

PETECHIÆ, spots formed by extravasated blood, as in typhoid, putrid and malignant fevers, hemorrhagic smallpox, etc.

PETER, the Greek surname of an apostle of Jesus. It is the rendering of the East Aramæan *kepha*, a corruption or derivation from Heb. *keph*=a rock,

STATUE OF ST. PETER, FLORENCE, ITALY

and was given by Jesus (John i: 40–42). Peter's real name was Simon (Matt. x: 2; Luke iv: 38, v: 3, 5, etc.), his father's Jonas (John xxi: 15), his brother's Andrew (Matt. iv: 18). Peter was born at Bethsaida (John i: 44), but had removed to Capernaum, where he had a house, being a married man (Matt. viii: 14; Mark i: 30; Luke iv: 38; I Cor. ix: 5). He was one of the 3 of the 12 apostles selected on three occasions by Jesus for special honor. The power of the Keys was first bestowed on him (Matt. xvi: 13–20), though afterward also on the other apostles (xviii: 1). Peter was of an impulsive temperament, generous, but too forward in speech (xvi: 22, 23), and rash in action (John xviii: 10). It was not natural cowardice, but because through his rashness he had committed himself, and was in danger of arrest, that made him deny his Lord (Matt. xxvi: 51–75). After the Ascension, he was for a time the most prominent of the apostles (Acts i: 15, ii: 14, etc., iii: 1–26; iv: 8, 9, v: 1–16), and though specially sent to the Jews (Gal. ii: 8), yet had the privilege of being the first to admit Gentiles into the Church (Acts x: 1–48). Afterward he was somewhat cast into the shade by the eminence of St. Paul. Tradition makes him die as a martyr at Rome, about A. D. 64, crucified with his head downward. Roman Catholics claim him as the first Bishop of Rome, and consider that the authority delegated him by Jesus appertains also to his successors, the Popes of Rome.

The First Epistle General of Peter, an epistle which claims to have been written by the Apostle Peter (i: 1), apparently from Babylon (v: 13), "to the strangers scattered throughout Pontus, Galatia, Cappadocia, Asia, and Bithynia" (i: 1), all places in Asia Minor. These strangers were obviously Christian converts, the majority apparently Gentiles (i: 14, ii: 10, iv: 3). Their churches were in charge of elders (v: 4). They were in suffering (i: 6), which the apostle foresaw would deepen into severe persecution (iv: 12–18). He exhorts them to steadfastness, to careful avoidance of crime and scandal. Its date is uncertain, probably between A. D. 60 and A. D. 64. There is strong evidence for its authenticity, which has rarely been doubted.

The Second Epistle of Peter, another epistle claiming to have been penned by the Apostle (i: 1), the author also referring to the transfiguration scene as one which he personally witnessed (i: 17, 18), and to a previous epistle (iii: 1). In this second letter he seeks to establish Christians in the faith, warns them against false teachers, and predicts the general conflagration of the world. Its style is different from that of the first. When it was published, the epistles of St. Paul had been collected, and formed

part of New Testament Scripture (iii: 15-16). The evidence for its authenticity is much less strong than that for the first epistle.

PETER I., ALEXEIEVITCH, usually styled PETER THE GREAT, Czar of Russia; born in 1672; and in 1689 he obtained the sole authority, on the retirement of his brother Ivan, with whom he had been before associated in the government of the empire. After having suppressed a conspiracy of the Strelitzes against his life, he traveled in foreign countries, not in the character of czar, but as a member of an embassy. At Amsterdam he worked, *incognito*, in a shipyard, went to the village of Saardam, where he caused himself to be enrolled among the workmen, under the name of Peter Michaeloff. Induced by his love for the sea to accept the invitation of William III. to visit London, he

PETER THE GREAT

spent some weeks there, keenly observing and learning all that he could of trade, manufactures, and the arts. Having proceeded to Vienna, he there received intelligence of a new rebellion of the Strelitzes, on which he returned home, crushed the insurrection, and visited the rebels with fearful severity. In 1700 he entered upon a war with Sweden. He was defeated by his great rival, Charles XII., at the battle of Narva, and the war went on with various results till 1709, when he completely defeated Charles at Pultawa. In the following year the Sultan declared war on him, and he narrowly escaped capture by the Turks in the campaign of 1711. This war ended in 1713. Not satisfied with his immense power as czar, Peter had suppressed the patriarchate, and made himself head of the Church as well as of the State. In 1703 he founded St. Petersburg, and began the fortifications of Cronstadt. Three years later he privately married Catharine, a girl of low origin and immoral character; married her publicly in 1710, and had her crowned in 1722. Peter extended the limits of the empire both in Europe and Asia; changed the face of Russia by his zealous promotion of trade, navigation, manufactures, and education; and after a conclusion of peace with Sweden, received the title of Emperor of all the Russias, and Father of his Country. Reforming others, he failed to reform himself, but remained to the last an ignorant, coarse, brutal savage. His state policy has been adhered to by his successors. Peter I. died in St. Petersburg, after very severe suffering, Jan. 28, 1725.

PETER II., Emperor of Russia; born in 1714; the son of Alexis and grandson of Peter the Great. He succeeded, in 1727, the Empress Catharine, who had declared him Grand-Duke of Russia the year preceding. The most remarkable event of his reign was the disgrace of the prime minister Menschikoff, who was banished to Siberia. He died in 1730.

PETER III., Emperor of Russia; the son of Anne, eldest daughter of Peter the Great; born in 1728, and succeeded Elizabeth in 1762. He married the Princess Sophia Augusta of Anhalt, whose name he changed to Catharine, and, being inspired with grand and martial thoughts, attempted to govern his empire on the model of Frederick the Great; but, wanting capacity, energy, and courage, he signally failed. His empress, being apprised of his intention of divorcing her and bastardizing his son, Paul, anticipated his design, and, exciting a revolution, took him prisoner, and compelled him to sign a most humiliating abdication. After this, being sent to the fortress of Robscha, he there mysteriously disappeared in 1762.

PETER I., KARAGEORGEVITCH, King of Serbia; born in Belgrade in 1846, a grandson of George Petrovitch, surnamed "Black George," (Kara-george), a peasant leader of the people who led a successful revolution against Turkish sovereignty, and was recognized by the Sultan as Prince of Serbia in 1812. His son, Alexander, father of Peter, was deposed in 1858, and left the country with his son. Peter was educated in Hungary, but later became a cadet at the French military school at St. Cyr. Graduating, he received a commission in

the French Army, and served with distinction during the Franco-Prussian War, being thrice captured by the Germans, and escaping each time. Afterward he lived in retirement in Paris and Geneva. In 1903, King Alexander of Serbia, a member of the Obrenovitch family, rival of the Karageorgevitch dynasty, was assassinated by army officers, and Peter was proclaimed ruler in his place. In 1914, he went into the field at the head of his army, and remained

PETER I, KING OF SERBIA

with his troops until the final invasion by the forces of the Central Powers in 1916, when he escaped through the mountains of Albania to the Adriatic Coast, where he was rescued by the Italian ships. Until the collapse of the Teutonic front in the Balkans in 1918, he remained in Greece, when he returned to Belgrade with his troops, following the retreating Austrians.

PETER, PARLEY. See GOODRICH, SAMUEL GRISWOLD.

PETER PINDAR. See WOLCOTT, JOHN.

PETERBOROUGH, a city partly in Huntingdonshire, but chiefly in Northamptonshire, England, the latter portion being on the left or N. bank of the Nen river, at the edge of the fen country, 76 miles N. of London. Here, at Medeshamstede, in 655, the Mercian thane Saxulf founded the great Benedictine abbey of SS. Peter, Paul, and Andrew, which, destroyed by the Danes in 870, was restored in 966, plundered by Hereward in 1069, and again burned down in 1116. Its noble church, the cathedral since 1541 of a new diocese carved out of that of Lincoln, was built between 1118 and 1528, and thus, while essentially Norman, offers every variety of architecture down to the Perpendicular. It is 471 feet long, by 202 across the transept, and 81 high. The Early English W. front (1200–1222) consists of three mighty arches. Noteworthy also are the flat painted wooden ceilings of the 12th century, the portrait of "Old Scarlett" the sexton (1496–1594), the blue slab inscribed "Queen Catharine, A. D. 1536," and the grave for 25 years (1587–1612) of Mary Queen of Scots. In 1643 Cromwell and his troopers did hideous havoc to monuments, stained glass, and cloisters. Of the abbots may be mentioned Ernulf, Bishop of Rochester (1115); and of the 27 bishops, Lloyd and White the non-jurors, Richard Cumberland, Archbishop Magee of York, and Mandell Creighton the historian. Paley was a native. Two ancient gateways, the bishop's palace and the deanery (once the abbot's and prior's houses), and the chancel of a Becket chapel (now a museum) make up the remaining objects of interest. Peterborough is an important railway center, has manufactures of agricultural implements, and carries on a large trade in malt, coal, farm produce, etc. Incorporated as a municipal borough in 1874, it has returned two members to Parliament from 1547 till 1885, and since then one. Pop. (1917) 33,574.

PETERBOROUGH, a town and capital of Peterborough co., Ont., Canada; on the Otonabee and Trent Valley canal, and on the Grand Trunk and Canadian Pacific railroads; 85 miles N. E. of Toronto. It is well laid out, having wide and regular streets. The town is in the center of a rich agricultural region. It exports peas, oats, barley, wheat, flour, cheese, wool, and pork. The manufactures include steam engines, agricultural implements, mill machinery, etc. The largest lift-lock in the world designed to lift vessels 140 feet long, 65 feet in the air in one motion, was built in 1904. Peterborough was settled in 1825 by Col. Peter Robinson, in whose honor it was named. Pop. (1918) about 25,000.

PETERHEAD, a seaport and burgh of barony of Buchan, Aberdeenshire, Scotland, on a peninsula, 32 miles N. N. E. of Aberdeen. Founded in 1593, it is somewhat irregular in plan, but clean and largely built of the celebrated "Peterhead granite," whose reddish variety is so much used for monumental purposes. The Keiths, Earls Marischal

were superiors of the place till the rebellion of 1715, when the Old Pretender landed here, and after which their forfeited estates were purchased by the Edinburgh Merchant Maiden Hospital, to whose governors many improvements are owing. Of Marshal Keith a bronze statue was presented to the town in 1869 by King William of Prussia; and the market cross, a granite Tuscan pillar (1833), bears the arms of the Earls Marischal. The public buildings include the town hall (1788), with spire 125 feet high; the parish church (1803), with one of 118 feet. Of industries may be mentioned the woolen manufacture, boat building, and granite polishing. Peterhead was made a head port in 1838. From 1788 it gradually became the chief British seat of the seal and whale fisheries till 1852. At present Peterhead is chiefly important for its great herring fishery, which during the herring season brings some 5,000 persons to the place. The S. harbor was commenced in 1773, and the N. harbor in 1818, a canal being formed between them in 1850; while a new harbor was formed and the S. harbor deepened under acts of 1873 and 1876. Their three basins, hewn out of the solid rock, together cover about 22 acres, but are as nothing compared with the great harbor of refuge, begun in 1886, which, but for the World War, would have been completed in 1921. In the neighborhood are the ruins of Inverugie, Ravenscraig, and Boddam castles, all strongholds of different branches of the Keiths; Buchan Ness, the most E. point of Scotland, with a lighthouse (1827); and the Bullers of Buchan. Pop. (1918) 14,000.

PETERHOF, a palace of the emperor of Russia, on the S. shore of the Gulf of Finland, 18 miles W. of St. Petersburg, built by Peter the Great in 1711, contains a fine collection of paintings, and is surrounded by beautiful parks and gardens laid out on the model of those at Versailles, with cascades, terraces, and summer houses. Pop. (1918) about 15,000.

PETER MARTYR, the patron saint of the Inquisition, a Dominican of Verona, who, for the severity with which he exercised his inquisitorial functions, was in 1252 slain at Como by the infuriated populace. His death formed the subject of a masterpiece by Titian, destroyed by fire in Venice in 1867.

PETER MARTYR, an Italian reformer; born in Florence, Italy, Sept. 8, 1500; entered at 16 the order of the canons regular of St. Augustine at Fiesole, studied at Padua, and became abbot of Spoleto, and later prior of St. Peter at Aram near Naples. Here he was drawn into the doctrines of the Reformers by the teaching of Juan Valdes and Ochino, yet was appointed visitor-general of his order in 1541. His rigor made him hateful to the dissolute monks, and he was sent to Lucca as prior of San Frediano, but soon fell under the suspicions of the Inquisition, and had to flee to Zurich (1542). At Strassburg he was welcomed by Bucer, and made Professor of the Old Testament. In 1547 he went to England on Cranmer's invitation, lectured at Oxford on I Corinthians and Romans, and took an active part in the great controversy of the day. Mary's accession drove him back to Strassburg, then grown too Lutheran for his tastes, and at length in 1555 he repaired to Zurich, where he died Nov. 12, 1562.

PETERS, CARL, a German traveler and administrator. He was born at Newhaus, Hanover, in 1856, and studied at several German universities, and in London. He then traveled through parts of Africa, suitable for German colonization, becoming head of several German colonizing organizations, passing between Germany and Africa. In 1888 he led an expedition to Victoria Nyanza, and went to the aid of Stanley and Emir Pacha. In 1891 he acted as Reichscommissär in East Africa, and later formed companies for gold prospecting in Rhodesia, returning to Berlin in 1914. His works include: "Die Deutsche Emir Pascha Expedition"; "Das Goldene Ophir Salomos"; "Im Goldlande des Altertums"; "England und die Engländer"; "Die Gründung von Deutsch-Ostafrika"; "Zur Weltpolitik."

PETERSBURG, a city and port of entry of Dinwiddie co., Va.; on the S. bank of the Appomattox river, the Upper Appomattox canal, on the Atlantic Coast Line, the Norfolk and Western, and the Seaboard Air Line railroads; 22 miles S. of Richmond. Here are the Central State Hospital for the Insane, Home for the Sick, and Industrial Institute, libraries, parks, National and State banks, street railroads, electric lights, and daily and weekly newspapers. The handling of cotton and tobacco, with wheat, corn, and general country produce, is the chief business. The city has tobacco factories, cotton factories, flour and grist mills, and silk mills. The so-called siege of Petersburg lasted from June 16, 1864, to April 2, 1865; and during its continuance 13 pitched battles were fought in the neighborhood. The intrenchments of Lee and Grant still form conspicuous features in the landscape; Grant's lines extended from the Appomattox to Fort Fisher, and thence

E. to Fort Bross, a distance of 23 miles. One of the best-known engagements was that of the old crater, to the E. of the city, on Griffith's farm, where a small museum of war relics is exhibited. Pop. (1910) 24,127; (1920) 31,002.

PETER'S PENCE, a tax of a penny on each house throughout England, which commenced in Saxon times as an occasional voluntary contribution, but was finally established as a legal tax under Canute, Edward the Confessor, and William the Conqueror. From being sent to Rome it was called by the Saxons rome-feoh, rome-scot and rome-penny-ing. The name Peter's pence arose from its being collected on St. Peter's Day. From being levied on every private and every religious house, the Abbey of St. Albans only excepted, it was called also hearth money. At first it was used chiefly for the support of an English college at Rome, then the Pope shared the gift with the college, and finally appropriated the whole. Edward III. forbade its being paid; but it was soon restored. An act of Henry VIII., passed in 1534, swept it away. A voluntary contribution was raised among Catholics, and sent to the Pope for his private use.

PETER THE CRUEL, King of Castile and Leon; born in 1334; succeeded his father, Alfonso XI., in 1350. His reign was one long series of cruelties and despotic acts. The year following his coronation he put to death Eleanora de Guzman, his father's mistress. In 1353 he married, though contrary to his will, Blanche of Bourbon, one of the most accomplished princesses of the time, whom, however, he abandoned two days after his marriage to rejoin his mistress, Maria Padilla. The queen was imprisoned and divorced. He then married the beautiful Juana de Castro, but only to abandon her after a few months. Two revolts against him were unsuccessful. In 1366, Peter fled, and was dethroned, but he was reinstated the following year by an army lent by Edward the Black Prince. Executions and confiscations helped to swell the ranks of his opponents, of whom the chief was his half-brother Henry of Trastamare. In 1369 Henry gained a signal victory over Peter at Montiel, and the latter was slain in a sword combat with his brother in 1369.

PETER THE HERMIT, a French gentleman of Amiens, in Picardy, who renounced a military life to embrace that of a pilgrim. At the end of the 11th century, a general alarm was spread that the last day was approaching; on which numbers of persons flocked to the Holy Land from all countries with a view of ending their days near the holy sepulcher. Peter was of the number, and on his return to Europe made so pathetic a representation of the state of the Christians in Palestine to Pope Urban II., that he gave Peter leave to preach up the necessity of a crusade throughout Christendom. The appearance, zeal, and eloquence of the hermit, produced a prodigious effect, and all ranks and ages, of both sexes, pressed eagerly into the service. With a motley army, estimated at 100,000 men, Peter passed through Hungary. In his absence, his followers attacked Solyman's army at Nicea, and all, except a few thousands, perished. Peter remained in Palestine, and was at the siege of Antioch in 1097; but on his attempting to make his escape, shortly afterward, was brought back, and compelled to take a new oath of fidelity and obedience to the holy cause. Two years later he was present at the siege of Jerusalem, where he displayed great bravery, and when the place was taken, was made vicar-general. Peter, on his return to France, founded the abbey of Neufmoustier, at Huy, in Liège, where he died in 1115.

PETERWARDEIN, one of the strongest fortresses in Austria; situated in a marshy, unhealthy locality on the right bank of the Danube; 44 miles N. W. of Belgrade; and connected with Neusatz opposite by a bridge of boats. The fortress was held by the Turks from 1526 to 1687. In 1688 the fortifications were blown up by the imperialists, and the town was soon after burned to the ground by the Turks; but at the peace of Passarowitz (1718) it remained in the possession of the emperor. Here, on Aug. 10, 1716, Prince Eugene obtained a great victory over the Grand Vizier Ali. The Hungarians were compelled to surrender the fortress to the Austrians in September, 1849.

PETIOLE, the leaf stalk of a plant, the part connecting the blade with the stem. It is generally half cylindrical, often channeled above, but in some monocotyledons it is cylindrical, and in others it is a sheath.

PETITION, an entreaty, a request, a supplication, a prayer; a solemn, earnest, or formal prayer of entreaty addressed to the Supreme Being, or to a superior in rank and power. A single article, or several, in a prayer; as, the several petitions of the Lord's Prayer. A formal written request or application made to one vested with authority, or to a legislative or administrative body, soliciting a favor, grant, right, or act of mercy. The paper or document containing such request or application; especially applied

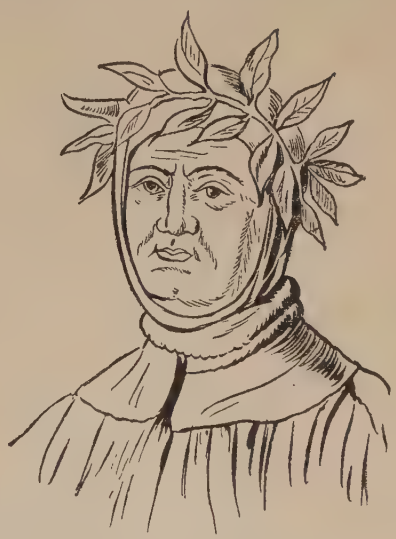
in legal language to an application to a court or judge, as a petition for a divorce.

PETITION OF RIGHT, a declaration of the rights of the people put forward by the Parliament of England in the third year of the reign of Charles I., and assented to by him. They are: (1) That no man be compelled to pay any moneys to the state without common consent by act of Parliament. (2) That no person be imprisoned for refusing the same, nor any freeman be imprisoned without any cause showed, to which he might make answer. (3) That soldiers and mariners be not billeted in the houses of the people. (4) That commissions be no more issued for punishing by the summary process of martial law.

PETLURA, SIMON, nationalist leader of the Ukrainians, or Little Russians; born in Poltava, south Russia, 1880, son of a coachman, educated in the lower clerical schools, then expelled from the higher schools because of his revolutionary activities. Inspired a peasant uprising in the Ukraine in 1902, through a pamphlet entitled "Uncle Mitra." The repression of the rebellion was followed by his flight into Austrian Galicia. At the outbreak of the war, in 1914, he enlisted with the workers behind the lines in the Zemstvo Union, for which he did good service until the revolution which dethroned the Czar. It was not till the overthrow of the Kerensky government that he became an open advocate of a separate national government for the Ukraine. When the Germans obtained control of the Ukraine, through the Skoropadsky government, Petlura was imprisoned, and remained in prison until the German defeat brought about the downfall of Skoropadsky. The National Ukrainian Union, composed of the peasantry who desired an independent national life, then set up a government represented by an executive committee of four, chief of which was Petlura. On Dec. 21, 1918, Petlura, having organized an army in the name of this government, entered Kiev, the capital. Though a Socialist by sympathy, Petlura resisted the advance of the forces of the Bolshevist Soviet Government. He was, on the other hand, also hostile to the reactionary forces under Denikine. He was driven out of Kiev by the Bolshevist forces in the summer of 1919. Early in 1920, he reached an agreement with the Polish Government, whereby he joined forces with the Poles for the purpose of expelling the Soviet armies from the Ukraine. Early in May, 1920, his forces, together with the Polish army, entered and took possession of Kiev.

PETRA, a ruined city, formerly the Nabathæan capital of Arabia Petræa, in a narrow valley of the Wady Musa, about 110 miles S. S. E. of Jerusalem. It appears to have been a place of considerable extent and great magnificence, for its ruins, partly temples, etc., cut out of the solid rock, cover a large space. It seems to have been the Joktheel of the Old Testament, taken by Amaziah from the Edomites.

PETRARCH, FRANCESCO PETRARCA, an Italian poet; born in Arezzo, Italy, in 1304. His father, a friend of Dante, and, like him, an exile from Florence, settled afterward at Avignon, and brought him up to the law, for which he had no relish. He studied at Montpellier and Bologna and afterward returned to Avignon, where his deep, hopeless passion for the beautiful Laura gave shape and color to the rest of his life. Petrarch took part in the political affairs of his time, was the friend of popes and princes, and was employed in many im-



FRANCESCO PETRARCH

portant negotiations. He rendered very great service to literature and learning by his diligent researches for, and collections of, ancient manuscripts and other remains; and by the gift of his books to the Church of St. Mark, Venice, he became the founder of its famous library. He was the friend of Boccaccio, who shares with him the honor of reviving classical literature, and of Rienzi. In 1341 Petrarch was crowned laureate in the capitol of Rome. Petrarch was at Rome during the Jubilee of 1350; lived afterward at Vaucluse, Milan, Padua,

Venice, and, in 1370, removed to Arqua, in the Euganean Hills. His works are partly in Italian and partly in Latin. His Italian "Sonnets," "Canzoni," and "Triumphs," all sweet, exquisite, glowing variations on one theme, Laura, have placed him as one of the most celebrated of poets. He modeled the Italian sonnet, and gave to it, and to other forms of lyrical poetry, an admirable polish, diction and melody. After long continued ill health, he died sitting among his books, July 18, 1374.

PETREL, a popular name for any individual of the family *Procellariidæ*, small oceanic birds of dusky plumage, nocturnal in habit, widely distributed, but most abundant in the Southern Hemisphere. They are considered by sailors as the harbingers of stormy weather. Many of them nidificate in holes and the majority lay but one egg, usually white. *Œstrelata hesitata*, the capped petrel whose habitat is the West Indian Islands, has been met with in Hungary. *Procellaria* (*Thalassidroma*) *pelagica* is Mother Carey's chicken, or the storm petrel; *Cymochorea leucorrhoa* is the fork-tailed, or Leach's petrel; and *Oceanites oceanicus* is Wilson's petrel.

PETRIE, WILLIAM MATTHEW FLINDERS, an English Egyptologist, grandson of Captain Flinders, the Australian explorer; born June 3, 1853. He made measurements of prehistoric monuments in Great Britain (1875–1880); discovered and excavated the Græco-Egyptian city of Naukratis, in the Delta; and examined the interior of the pyramids at Hawara and Illahun. The results of his researches are found in "Stonehenge: Plans, etc." (1881); "Pyramids and Temples of Gizeh" (1883); "Tanis" (1885–1888); "Ten Years' Diggings in Egypt" (1892), a popular summary of his Egyptian work; "Six Temples at Thebes" (1897); "Researches in Sinai" (1906); "Arts and Crafts in Egypt" (1909); "Egypt and Israel" (1911); "Tools and Weapons" (1917). Professor of Egyptology, University College, London.

PETRIFACTION, the act or process of petrifying or changing into a stone; the state of being petrified; conversion of any organic matter, animal or vegetable, into stone, or a substance of stony hardness. A "petrifaction" is not, strictly speaking, a transformation of the original animal or plant into stone. It is merely a replacement of the organic tissue by mineral substance. As each particle of the plant or animal decays and disappears its place is taken, usually in water or mud, by a particle of mineral matter deposited from the water which has held it in suspension. Thus the perishable original is changed into imperishable stone. By such means have the skeletons of animals millions of years old been preserved in the rocks of the everlasting hills. In the same way whole forests of trees in the Yellowstone region and elsewhere are changed into agate and other forms of stone, the hollow logs of the forest primeval being often found filled with beautiful crystals of quartz and amethyst.

PETROGRAD, the name given St. Petersburg, the capital of the Russian Empire, following the outbreak of the World War in 1914. The estimated population in 1920 was 600,000.

PETROGRAPHY, the art of writing on stone. Also the study of rocks; a scientific description of or treatise on rocks; that branch of geology which deals with the constitution of rocks; petrology.

PETROLATUM. Vaseline, petroleum jelly. A pale yellow to amber colored, oily, translucent, semi-solid substance, obtained by purifying the residue from the distillation of petroleum. Soluble in all common oil solvents, slightly soluble in alcohol, insoluble in water. Used in medicine, in the manufacture of shoe and metal polishes, and as a lubricant.

Liquid Petrolatum is a colorless, oily liquid, obtained from petrolatum, and consists of the fraction distilling between 330° and 390° C. It is chiefly used in medicine as an emollient.

PETROLEUM, a natural oil found in the earth, composed mainly of hydrocarbons. Its existence has been known since earliest times, but it was found in large quantities only following its discovery in Pennsylvania in 1850. Since that time there has been rapid development in its production. There was a discovery of oil fields in the United States, in Mexico, in Russia, and in Rumania. These are the chief producing countries, although oil is found in many other places on the earth's surface.

The chief feature in recent years has been the development of new oil fields in the mid-west part of the United States and in California. In 1919 377,719,000 barrels of petroleum were marketed. The total production in 1919 was 380,000,000 barrels. Of this over 100,000,000 barrels came from California, 116,000,000 barrels from the Oklahoma-Kansas fields, 68,000,000 barrels from the central and north Texas fields, and the remainder from the Gulf Coast and Rocky Mountain fields. The consumption of domestic crude petroleum in 1919

in the United States was 375,000,000 barrels.

The development of the internal combustion engine, driven by gasoline, has resulted in the growth of a great industry in the production of gasoline, which is a by-product of petroleum. The increased use of petroleum as fuel oil has greatly increased the consumption. The fuel oil consumption of railroads alone amount to about 40 million barrels yearly. The gasoline production in 1919 was about 3,500,000,000 gallons.

Mexico is one of the great petroleum countries. In 1919 the production was nearly 100 million barrels. The production in Russia decreased greatly on account of the conditions resulting from the war.

The possibility of the exhaustion of petroleum fields in the United States has received considerable attention and steps are being taken to conserve the supply as far as possible, or to provide for the control of other fields from which additional supplies can be obtained. The world production of petroleum in 1917 was 506,702,902 barrels, of which about 335,000,000 barrels were produced in the United States.

PETROLEUSE, a name given to the women of the French Commune in 1871, accused of helping to burn the Tuileries, city hall, and other public buildings by pouring petroleum on them. The charge has been denied by some historians.

PETROLOGY, the study of the mineralogical and chemical composition of rocks; including the various changes they have undergone through physical and chemical agencies, either combined or separate. Macroscopic and microscopic examination, together with chemical analysis, are the methods pursued.

PETROPAVLOVSK, a town of Asiatic Russia, in the province of Akmolinsk, on the river Ishim, 175 miles W. N. W. of Omsk. It is an important military station, with a fort founded in 1752, and has a large transit trade. Pop. (1913) 42,340.

PETROPAVLOVSKI, a fortified town on the E. coast of Kamchatka, was attacked by an English and French squadron, Aug. 30, 1854. They destroyed the batteries, but failed in taking some Russian frigates, except the "Sitka," a store ship and the "Pique." Admiral Price was killed. A party of 700 sailors and marines landed to assault the place, but fell into an ambuscade; many were killed, including Captain Parker and M. Bourasset, English and French officers. The objects of the attack were not attained. After this the Russians greatly strengthened their defenses, but on May 30, 1855, the allied squadron in the Pacific arriving here found the place deserted. The fortifications were destroyed, but the town was spared. The Russian ships escaped.

PETROZAVODSK, a town of Russia, on the W. shore of Lake Onega, 300 miles N. E. of St. Petersburg, has a cannon foundry and small-arms factory, built in 1774.

PETUNIA, a genus of American herbaceous plants, natural order *Solanaceæ*, nearly allied to tobacco. They are much prized by horticulturists for the beauty of their flowers.

PEWTER. The finer pewter is an alloy of 12 parts tin, one part antimony, and a small quantity of copper; the coarser, of 80 parts tin and 20 of lead. The same ingredients as the finer pewter, but in different proportions (nine of tin to one of antimony) constitute Britannia metal. Pewter is a name also for a polishing material used by marble workers and derived from the calcination of tin.

PEZET, FEDERICO ALFONSO, a Peruvian diplomat. He was born in London, England, in 1859, and there partly educated, later going to Peru, and serving in the war with Chile. In 1886 he became consul at Panama, and later in England and New York. He was Minister Plenipotentiary to Panama in 1909, and from that year to 1912 special envoy to Central America and Panama. In 1912 he became minister to the United States. His books include: "Peru: Its Commerce and Resources"; "The Question of the Pacific"; "What the Panama Canal Means to Peru."

PFÄFERS, hot springs in the canton of St. Gall, Switzerland, in the deep and gloomy gorge of the Tamina torrent, which joins the Rhine at Ragatz, 2½ miles to the N. They were discovered toward the middle of the 11th century, and have been used ever since. The water is conducted in pipes to Ragatz, though there are bath houses (1704) in the ravine. Near the village of Pfäfers, which stands above and outside the ravine, is a Benedictine abbey, founded in the 8th century, but converted into a lunatic asylum after its dissolution in 1838.

PFENNIG, or **PFENNING**, a small copper coin of various values, current in Germany and the neighboring states. The *pfennig* of the German empire is the hundredth part of the mark.

PFLEIDERER, OTTO, a German theologian; born in Stetten, Württemberg, Sept. 1, 1839; studied under Baur, at Tübingen, from 1857 till 1861; became pastor at Heilbronn in 1868, and superintendent at Jena in 1870, exchanged for the chair of Theology there. In 1875 he was called to be Professor of Systematic Theology at Berlin. In New Testament criticism Pfleiderer belonged to the younger critical school. He made his name as well known in England and America as in Germany by a series of works which no serious student of philosophy or theology can afford to overlook. Of these the chief are "Religion, its Essence and History" (1869); "Paulinism" (1873 English translation 1877); "Philosophy of Religion" (1878); "Outlines of Christian Faith and Ethics" (1880); "The Development of Theology since Kant" (1880); "The Philosophy and Development of Religion" (1904). He died July 18, 1908.

His brother, **EDMUND PFLEIDERER**, born in Stetten Oct. 12, 1842, studied at Tübingen; was made Professor of Philosophy at Kiel in 1873, whence he was called to Tübingen in 1878. His writings include "Studies on Leibnitz" (1870); "On Empiricism and Scepticism in Hume's Philosophy" (1874); "Modern Pessimism" (1875); "Kantian Criticism and English Philosophy" (1881); "Lotze" (2d ed. 1884); "Heraclitus of Ephesus" (1886), etc. He died April 2, 1902.

PFORZHEIM, a manufacturing town of Baden; at the N. border of the Black Forest, 20 miles S. E. of Carlsruhe. In contains the remains of an ancient castle, from 1300 to 1565 the residence of the Margraves of Baden-Durlach, and was the birthplace of Reuchlin. The town is famous for the manufacture of gold and silver ornaments, has chemical and iron works, machine-shops, tanneries, paper and other factories. There is a trade in timber, cattle, ornaments, etc. The town was burned by the French in 1689. Pop. about 50,000.

PHÆDO, a Greek philosopher of Elis, who flourished about 400 B. C., was originally a slave, but obtained his freedom by the interest of Socrates, whose disciple he became, and remained with him till his death. After this he settled at his native place, where he founded a school of philosophy.

PHAËTON, in Greek mythology, according to Ovid, a son of the sun, or Phœbus. Venus became enamored of him, and intrusted him with the care of one of her temples. This favor rendered him vain, and led to his asking his father's permission to drive his chariot one day. Phœbus represented the dangers to which this would expose him; but in vain. He undertook the aërial journey. The flying horses immediately departed from the usual track. Phaëton repented too late of his rashness; heaven and earth were threatened with a universal conflagration, when Jupiter struck the rider with a thunderbolt, and hurled him headlong down into the river Po. His body, consumed with fire, was found by the nymphs of the place. There was a drama by Euripides on Phaëton. Also an open carriage like a chaise, on four wheels, and drawn by two horses.

PHAGOCYTES (leucocites), microscopic masses of protoplasm capable of ameboid movements, occurring in the blood lymph, and bone marrow, where they absorb and assimilate bacteria and microbes appearing therein.

PHALANGER, in zoölogy, the popular English name for any individual of the sub-family *Phalangistinæ*. Phalangers are small woolly-coated marsupials, with opposable great toes, which are destitute of a nail. They are, for the most part, vegetable feeders, though some are insectivorous. They may be grouped in two classes, those with, and those without, a flying membrane.

PHALANX, in Greek antiquities, the close order of battle in which the heavy-armed troops of a Grecian army were usually drawn up. In anatomy, phalanges or phalanxes are the small bones of the fingers and toes, so called from their regular disposition. Normally each digit has three phalanxes. Called also internodes.

PHALARIS, a small genus of grasses, of which the seed of one of the species, *P. canariensis*, or canary grass, is extensively employed as food for birds, and commonly known as canary seed.

PHALAROPE, the popular name of any individual of the genus *Phalaropus*, extending throughout northern Europe and northern Asia. The red or red-necked phalarope (*P. hyperboreus*), about the size of a sandpiper, has the upper parts blackish-gray, the feathers edged with red, sides of the neck chestnut; thorax, breast, and belly white. The gray phalarope (*P. fulicarius*) is so called from the prevailing hue of its winter plumage; in summer the upper parts exhibit a mixture of black, white, and yellow; breast and under parts reddish chestnut. It is rather larger than the first species. Wilson's phalarope (*P. wilsonii*) is a North American bird; the lobes of the toes have a narrower border, and the legs are longer and slenderer

than in the other species. They feed on minute crustacea, and their flesh is oily and unpalatable.

PHALLISM, the worship of the fertilizing power of nature under the symbol of the phallus. The idea that natural productions were engendered in a manner akin to the propagation of man and the lower animals is poetically expressed by Vergil and Lucretius. Phallism appears to have been at first an independent cult, but was afterward adopted into other forms of worship. The Phœnicians ascribed its introduction into their worship to Adonis; the Egyptians to Osiris, the Phrygians to Atys, and the Greeks to Dionysos.

PHARAOH, the name borne in the Bible by 10 kings of Egypt; the best known of which are, the monarch to whom Joseph explained his dream, and who loaded him with honors; he who commenced the persecution of the Hebrews, and who put to death all the male children; and he who was summoned by Moses to permit of the departure of the Hebrew people, and who was afterward drowned, with all his host, in the waters of the Red Sea.

PHARISEES, the most numerous of the three divisions or orders of Judaism in the time of Christ, the other two being the Essenes and the Sadducees. They were so called because they kept aloof from Levitically impure food, separated themselves from the lawless people of the land, and united to keep the Mosaic law. They arose immediately after the return from the Babylonian captivity. As all the students of the law naturally joined this association, the appellation Member, Associate, *chaber*, or Pharisee, *parush*, became synonymous with student, disciple, lawyer, scribe. Accordingly, they represented the national faith of orthodox Judaism. Some Pharisees fell into extravagances, and laid more stress on trifling and petty formulæ than on the spirit of the law, to whom the rebukes of Christ refer, and who have given rise to the term Pharisee being used as synonymous with a strict observer of external forms of religion without the spirit of it. See SADDUCEE.

PHARMACOPŒIA, a book containing the prescriptions for the preparation of medicines recognized by the general body of practitioners. Up till 1863 separate pharmacopœias were issued by the Colleges of Physicians of London, Edinburgh, and Dublin. Since then a British pharmacopœia, issued by the medical council of the kingdom, is recognized by the whole medical profession of Great Britain. There is also an American pharmacopœia.

PHARMACY, or **PHARMACEUTICS**, the art of preparing, compounding, and combining substances for medical purposes; the art of the apothecary.

PHARNACES, a King of Pontus; the son of Pontus, the son of Mithridates V., and grandfather of Mithridates the Great. He made war against the King of Pergamus, and reigned between 190–157 B. C.

PHARNACES, King of the Cimmerian Bosporus; son of Mithridates VI., King of Pontus, and revolted with the army against his father, who slew himself in despair, 63 B. C. Pharnaces cultivated the friendship of the Romans, and in the war between Cæsar and Pompey, he remained neutral; but Cæsar declared war against and defeated him 47 B. C., after a struggle of three days only. It was on that occasion that Cæsar wrote to the Roman senate, in allusion to his easy triumph: "I came, saw, and conquered" (*Veni, vidi, vici*). Pharnaces died shortly afterward.

PHAROS, a lighthouse. The name is derived from the island of Pharos, close to and now part of Alexandria, which protected the port of that city. On the E. promontory of the island stood the lighthouse of Alexandria, so famous in antiquity, and considered one of the wonders of the world, built 300 years B. C.

PHARSALUS, now FERSALA, a town of Thessaly, to the S. of Larissa, on a branch of the Salambria, and accordingly in the part of Thessaly restored to Greece in 1881. The district, Pharsalia, is historically notable mainly for Cæsar's great victory over Pompey on Aug. 9, 48 B. C.

PHARYNX, the dilated commencement of the gullet. There may be a diffused erysipelatous inflammation, an ordinary or a syphilitic ulcer of the pharynx, or foreign bodies may become imbedded in it.

PHASCOLOMYS, wombat, the sole genus of the family *Phascolomyidæ*. Tail rudimentary; stomach simple; cæcum very short, wide, and with a peculiar vermiform appendage. Three species are known; they may be divided into two groups: (1) *P. wombat* and *P. platyrhinus*, the common and broad-nosed wombats; and (2) *P. latifrons*, the hairy-nosed wombat. They are terrestrial, burrowing animals, vegetable feeders, from the S. of Australia, Tasmania, and the islands of Bass' Straits.

PHASE, or **PHASIS**, in astronomy, one of the gradual changes undergone by the moon in passing from an unillumined state (new moon) through that of a continually broadening crescent to a complete orb (full moon), and back to new moon again. Similar phases are undergone by the inferior planets, Mercury and Venus, though, owing to their small size and the excessive brightness of the latter planet under the telescope, the phenomenon is not so easily seen. In mineralogy, transparent green quartz. In physics, any one point or portion in a recurring series of changes, especially when contrasted with another point, as, the phases in the waves of vibration, in the tides, in the motion of a pendulum, etc. In physiology, the several changes which the human and other organisms undergo in the progress from birth to maturity, and thence again to decline and death.

PHASIS, in ancient geography, a river in Colchis, now called Rion or Faz. It rises in the Caucasus, and flows W. into the Euxine near the ancient city of Phasis.

PHEASANT, *Phasianus colchicus*, and, more widely, any bird of the sub-family *Phasianinæ*. The common European pheasant probably had its original home in the East. It was esteemed by epicures, but was then only within reach of the wealthy. It is one of the most

ARGUS PHEASANT

MONGOLIAN PHEASANT

highly prized game birds. The adult male pheasant is a beautiful bird, about three feet long. Head and neck deep steel-blue, shot with greenish-purple and brown; eye surrounded by a patch of scarlet skin, speckled with blue-black; ear-coverts brown; back a light golden-red, the feathers of the upper part tipped with velvet-black, of the lower part marked with brown. Quill feathers brown, of various shades, tail feathers oaken-brown, barred with a darker shade and with black. Breast and front of the abdomen golden-red with purple reflections, feathers edged with black; rest of abdomen and under tail-coverts blackish-brown. The female has yellowish-brown plumage, and is about two feet in length. Other species known respectively as Shaws, the Yarkand, the Mongolian, the ring-necked, the Formosan, the ringless Chinese, the Japanese, the green-backed golden, Wallich's, Reeves', and Sœmmering's pheasant, the golden, Lady Amherst's pheasant and silver pheasant.

PHELAN, JAMES DUVAL, United States Senator from California. Born in San Francisco April, 1861; graduated from St. Ignatius College, 1881. Although a lawyer, most of his time has been occupied with the affairs of his city, state and nation. He took a prominent part in the relief work which took place after the great fire in San Francisco, and from 1896–1902 was mayor of that city. In 1913 President Wilson appointed him special commissioner to deal with Santo Domingo affairs. In 1915 the Democrats of California sent him to the Senate.

PHELPS, AUSTIN, an American clergyman and author, born in West Brookfield, Mass., Jan. 7, 1820. He was pastor of the Pine Street Congregational Church, Boston, in 1842–1848; and Professor of Sacred Rhetoric in Andover Theological Seminary, in 1848–1879. He was noted as an original writer and an eloquent preacher. His works include: "The Still Hour" (1859); "The New Birth" (1867); "Men and Books" (1882); "English Style in Public Discourse" (1883). He died in Bar Harbor, Me., Oct. 13, 1890.

PHELPS, EDWARD JOHN, an American diplomatist; born in Middlebury, Vt., July 11, 1822; was graduated at Middlebury College in 1840; studied at the Yale Law School; was admitted to the bar in 1843; and settled in Burlington in 1845. In 1851 he was appointed Comptroller of the Treasury. In 1881–1885 he was Professor of Law in the Yale Law School and also lecturer on constitutional law in Boston University. He was minister to England in 1885–1889. During the Bering Sea dispute he was senior counsel for the United States. He died in New Haven, Conn., March 9, 1900.

PHELPS, ELIZABETH STUART. See WARD, ELIZABETH STUART (PHELPS).

PHELPS, WILLIAM LYON, author and university professor. Born in New Haven, Conn., in 1865; graduated from Yale in the class of 1887, receiving his doctor's degree four years later from the same university. The year following he became an instructor in English at Yale University and in 1901 Lampson professor of English language and literature. He has edited many school and college textbooks in English as well as reviewed many works for periodicals. He wrote several volumes of essays on the English classics, especially the novelists.

PHENACETIN, a drug prepared from carbolic acid, valuable in fevers, and, like antipyrin, of service in stilling pain and securing rest in cases of severe headaches, insomnia, and nervousness.

PHENOL, a name for CARBOLIC ACID (*q. v.*).

PHERÆ, a powerful city of Thessaly, near Mount Pelion; according to legend, the ancient royal seat of Admetus and Alcestis, and afterward of political consequence under "tyrants" of its own, who repeatedly attempted to make themselves masters of Thessaly.

PHI BETA KAPPA, the oldest of the American college Greek-letter societies. It takes its name from the initial letters of its motto, said to be *Philosophia Biou Kubernetes*, "Philosophy is the guide of life." It was founded in 1776 in the old "Raleigh Tavern" at Williamsburgh, Va., by forty-four undergraduates of William and Mary College, of whom John Marshall was one. Branches were established at Yale in 1780 and at Harvard in 1781, and to-day there are nearly a score in the principal colleges and universities of the Union. The Phi Beta Kappa is now simply "an agreeable bond of meeting among graduates." At Harvard there is an annual Phi Beta Kappa dinner, oration, and poem; the earliest and one of the most striking of Edward Everett's great orations was delivered before the society, with Lafayette for a guest, in 1824; and among the early poets were R. T. Paine ("The Ruling Passion") and Oliver Wendell Holmes (1829). The badge of the society is a golden watch key with the initials ΦBK. Admission to membership varies with different chapters.

PHIDIAS, the great Greek sculptor; born in Athens; probably between 490–480 B. C. He began to distinguish himself about 464, and was employed in public works at Athens under Cimon. He was one of the most intimate friends of Pericles, under whose rule he was appointed director of all the great temples and monuments which were to be erected in the city. Of these the most important were the Parthenon, or temple of Athena, on the Acropolis, and the Propylæa. He

PHIDIAS

executed a colossal statue of the goddess for the interior of the temple with his own hand. The well-known Elgin Marbles of the British Museum were the sculptured decorations of that unrivaled temple. At Olympia he executed the most magnificent of all his works—the statue of the Olympian Zeus. Like the Athena, it was of ivory and gold, and nearly 60 feet in height. It was destroyed by fire at Constantinople, whither it had been carried by the Emperor Theodosius. Phidias was charged with peculation and impiety on the ground of having introduced portraits of himself and Pericles on the shield of Athene. This attack was made on him as the friend of Pericles. The prevailing characteristic of the works of Phidias appears to have been an ideal sublimity of form never since equaled. According to the generally received account, he died in prison 432 B. C.

PHIGALIA, an ancient town of Arcadia, situated in its extreme S. W. corner. From its temple of Apollo, at Bassæ, 5 to 6 miles distant, a sculptured frieze representing the contests between the Centaurs and Lapithæ, and the Amazons and Greeks, was brought to the British Museum in 1812. Next to the Theseum at Athens it is the most perfect architectural ruin in all Greece. It was designed by Ictinus, one of the architects of the Parthenon at Athens, and measured originally 125½ feet long and 48 broad. It had 38 columns, of which 34 still stand.

PHILADELPHIA, a city coextensive with Philadelphia co., Pa., on the Delaware and Schuylkill rivers, and on the Pennsylvania, Philadelphia and Reading, and the Baltimore and Ohio railroads; 85 miles S. W. of New York. It is the third largest city of the United States; area, 130 square miles; pop. (1910) 1,549,008; (1920) 1,823,779.

Topography.—The city is built chiefly on a low peninsula between the two rivers. In the portion most thickly built up the highest elevation is 46 feet, but rises to 440 feet in the suburbs. It extends N. and S. about 22 miles, and is from 5 to 10 miles in width. There is a water frontage on the Delaware river of over 16 miles, of which more than 5 miles have docks. The harbor has been greatly improved by the removal of the islands in the middle of the river, and in front of the wharves there is an average depth of 50 feet. The Schuylkill river, which runs through the city, is navigable for large vessels to Walnut street, and is crossed by many bridges, of which the most costly are at Walnut street, Gray's Ferry, Spring Garden street, and Girard avenue. Another important bridge is the Walnut Lane bridge over the Wissahickon, one of the largest concrete bridges in the world. The section of the city W. of the Schuylkill is locally called West Philadelphia; another noted section is known as Germantown. League Island, containing a widely noted navy yard, has an area of 925 acres and lies just above the mouth of the Schuylkill.

Municipal Improvements.—The city owns a waterworks system which cost about $65,000,000. They have a daily capacity of 320,000,000 gallons, and the water is distributed through 1,800 miles of mains. There are in all 1,733 miles of streets, of which 1,549 are paved. The sewer system covers 1,386 miles. The city is lighted by electricity at a cost of $1,244,696 per annum. The average annual cost of the police department is almost $5,000,000, and that of the fire department $2,170,000. The annual death rate averages 24.19 per 1,000. The cost of maintaining the city government in 1919 was $35,514,399. Electric street car lines traverse the principal streets and extend to the various suburbs.

INDEPENDENCE HALL, PHILADELPHIA

Fairmount Park.—This is one of the largest public parks in the world. It extends more than 7 miles on both banks of the Schuylkill river, and more than 6 miles on both banks of Wissahickon creek, giving it an area of over 3,000 acres, traversed by 32½ miles of driveways. The park contains four reservoirs of the Schuylkill waterworks; Randolph Rogers' colossal bronze statue of Abraham Lincoln; statues of Washington, Garfield, Grant and others; the mansion (now occupied by a restaurant) in which Robert Morris lived during the Revolutionary War; the Solitude, a villa erected by John Penn, grandson of William Penn, in 1785; the Zoölogical Gardens; Commercial Museum; Belmont Glen, a beautiful ravine; and other points of interest. In 1876 the Centennial Exposition was held here. Memorial Hall, erected at a cost of $1,500,000, which was used for the art gallery of the Exposition, now contains a permanent indus-

trial and art collection. Here also is the Horticultural Building filled with tropical and other plants and surrounded by 35 acres of ground devoted to horticulture.

Notable Buildings.—In the heart of the city, at the intersection of Market and Broad streets, stands the City Hall, on a piece of ground which was formerly Penn Square. This great structure, usually called the Public Buildings, was built of white marble and granite; is 486½ feet long by 470 wide; contains 520 rooms, and including a court yard 200 feet square in the center, covers an area of nearly 4½ acres. The central tower rises to a height of 547 feet, 3 inches, and is surrounded by a colossal statue of William Penn, 37 feet in height. The total cost of the building was over $20,000,000. Besides this there are many other great buildings including the Masonic Temple, costing $2,000,000; the United States mint; the postoffice; the Bourse; the Stock Exchange; Independence Hall, famous as the State House of the colonial period, and as the depository of the Liberty Bell; the Pennsylvania Hospital, covering an entire square; the building of the Historical Society of Pennsylvania; the Philadelphia Library, containing upward of 500,000 volumes; Academy of Fine Arts, containing one of the most extensive collections of paintings, engravings, bronzes, and sculptures in the United States; Odd Fellows' Hall; several armories; custom house, copied from the Parthenon, and considered one of the best samples of Doric architecture in the world; the stations of the Pennsylvania, the Philadelphia and Reading, and Baltimore and Ohio railroads; etc.

Manufactures.—In its manufacturing products Philadelphia ranks next to New York and Chicago. There are upward of 8,000 manufacturing establishments, with more than 250,000 employes. The combined output amounts to more than $750,000,000. The chief products are locomotives, sugar and molasses, men's clothing, foundry and machine shop products, carpets and rugs, hosiery and knit goods, woolen and cotton goods, morocco, chemicals, packed meat, refined petroleum, and silk and silk goods. The great Cramp shipbuilding yards are on the Delaware, just W. of the heart of the city.

Commerce.—In the fiscal year ending June 30, 1920, the imports of merchandise aggregated in value $219,167,601, and the exports $449,691,705.

Banks.—On Sept. 12, 1919, there were 29 National banks in operation, having a combined capital of $22,955,000; surplus, $47,425,000; loans and discounts, $481,256,000; and deposits of about $400,000,000. The exchange at the United States clearing house, in the year ending Sept. 30, 1919, aggregated $21,320,246,000, an increase over the previous year of $2,392,202,000.

Education.—At the close of the school year 1918–1919 the enrollment in the public day schools was 221,069. There were 5,884 teachers. The annual cost of maintaining the public schools was $8,510,501. The institutions for higher education include: the University of Pennsylvania; the Jefferson Medical College; Woman's Medical College; the Hahnemann Medical College; the Philadelphia Polyclinic and College for Graduates; and the Medico-Chirurgical College. There are several colleges of dentistry, one of pharmacy and one of veterinary surgery. There are also Girard College, which was founded in 1831 by Stephen Girard for white orphan boys, Temple University, and the Drexel Institute.

Churches and Institutions.—There are more than 700 churches in Philadelphia, representing all the larger denominations and hundreds of charitable institutions. The most important hospitals are the University, the Insane, the Pennsylvania, the Orthopædic, Municipal, Woman's, Children's, Wills', Jewish, Episcopal, German, Presbyterian, Homeopathic, St. Mary's, and St. Joseph's. There are also many orphanages, homes for the aged, and other institutions of similar character.

Finances.—At the end of 1920 the total net funded debt of the city was $137,676,339. The assessed property valuation for 1920 was $1,805,494,000; tax rate, $28.50 per $1,000.

History.—In September, 1681, a small party of settlers, sent out by William Penn, arrived at the site of the present city, and in the following summer the place was laid out and named Philadelphia, the "city of brotherly love." Penn himself reached New Castle on the Delaware, with a large number of Quakers, on Oct. 27, 1682. He was well received by a small party of Swedes who lived in a part of the present city. Shortly after his arrival he made the first treaty with the Indians at Shackamaxon. In 1683–1684, and for some time afterward the immigration from England and Wales, Germany and Holland was considerable. Philadelphia was incorporated in 1691, but its charter was not received till 1701. The city was active in resisting British aggression in 1763–1764. On Sept. 5, 1774, the 1st Continental Congress met here, and on May 10, 1775, the 2d. Col. George Washington was appointed General and Commander-

in-Chief of the American army in the State House on June 15, 1775. Here also the Declaration of Independence was adopted July 4, and proclaimed July 8, 1776. The city was occupied by the British from September, 1777, to June, 1778. A battle was fought at Germantown on Oct. 4, 1777. In the summer of 1787 delegates from the various States met in the State House, and framed the Constitution.

PHILADELPHIA ACADEMY OF NATURAL SCIENCES, an association formed to promote the study of natural sciences, discuss subjects of scientific interest and encourage research in the physical sciences. For the latter purpose the Jessup Foundation has sufficient funds to provide free tuition for younger investigators interested in the sciences. The museum maintained by the society is reputed to possess the finest collection of shells in the world, and has many numerous and valuable collections of birds and fossils. The library of 80,000 volumes contains the records and proceedings of all the learned societies in Europe and America which have been published since the foundation of the society in 1812. Since 1817 the Philadelphia society has published a "Journal" and since 1841 its "Proceedings."

PHILADELPHIANS, a mystic sect emphasizing "brotherly love" (Greek *philadelphia*), founded in London in 1652 under the influence of Boehme by Dr. John Pordage (1608–1698) and Mrs. Leade and others. It had for a time a branch in Holland, but disappeared early in the 18th century.

PHILÆ, an island in the Nile, near Assuan and S. of Syene, in Nubia. It is a small granite rock, fringed with rich verdure, about 1,200 feet long and 450 broad, almost covered with ancient buildings of great architectural beauty and interest, though not of very ancient date. That to the E., a hypæthral or roofless hall, commonly called "Pharaoh's bed," belongs to the Greek and Roman period, and consists of 14 great columns with capitals of various patterns, connected at the lower part by solid walls; the length is 63 feet, the width 48. The great temple of Isis, to whom the island was sacred, was mainly built by Ptolemy Epiphanes, and continued by his successors, especially by Ptolemy III., Euergetes. To the N. stood the great propylon or gateway, 60 feet high and over 120 wide. This is the oldest part of the temple, and bears the name of Nectanebes II. (about 361 B. C.). The temple proper contains representations of the story of Osiris, his birth, bringing up, death. The building of the Assuan Dam has partially submerged the island.

PHILEMON, a member of the Colossian church (Col. ii: 7; iv: 9, 11, 14, Phil. 2, 10, 23, 24). The Epistle of Paul to Philemon: An epistle of Paul, in conjunction with Timothy, (i: 1), to Philemon, whose runaway slave, Onesimus, had come to Rome, and been converted by the apostles while the latter was a prisoner (i: 10), and advanced in years (9). Onesimus was most useful to his spiritual father (13), who, however, would not retain him, unless with his master's permission (14). He, therefore, sent him back, carrying the epistle with him, and counseling Philemon to receive him back now as a brother beloved (16). Anticipating his speedy release, he also requested Philemon to prepare him a lodging (22). The epistle seems to have been written in A. D. 63 or 64. Its genuineness is generally admitted.

PHILEMON AND BAUCIS, in classic mythology, a married pair, remarkable for their mutual love. Jupiter and Mercury, wandering through Phrygia in human form, were refused hospitality by everyone, till this aged pair took them in, washed their feet, and gave them such humble fare as they could provide. On going away, the gods took them with them to a neighboring mountain, on looking from which they saw their village covered with a flood, but their own cottage changed into a splendid temple. Jupiter permitted them to make any request they chose, but they only asked to be servants of his temple, and that they might die at the same time. When, accordingly, they were seated at the door of the temple, being now of great age, they were changed, Philemon into an oak, and Baucis into a linden.

PHILHARMONIC SOCIETY, a musical organization established in London, in 1813, welcomed Mendelssohn to England in 1829 and again in 1844. The New Philharmonic was founded in 1852. The Philharmonic Society of New York dates from 1842.

PHILIP, one of the 12 apostles, according to John's Gospel, "of Bethsaida, the city of Andrew and Peter," and who was called to follow Jesus at Bethany. After the resurrection he was present at the election of Matthias to the apostleship, but it is not again mentioned. In the Western Church he is commemorated May 1. PHILIP THE EVANGELIST, often confounded with the above, is first mentioned in Acts vi: 5. He preached at Smyrna.

PHILIP, the name of various European rulers, as follows:

MACEDON

The name of five kings, the most celebrated of whom was PHILIP II., father of Alexander the Great, and son of Amynthas II.; born 382 B. C. He was brought up at Thebes, and began to reign after the death of his brother, Perdiccas III., in 359. With great ability, energy, and success, he first secured the internal peace, improved the discipline of his army, and created the famous phalanx. He aspired to make himself master of all the states of Greece, and then to invade and conquer Persia. The siege and capture of Amphipolis, Pydna, and Potidæa took place between 358–356. Four years later, after taking Methone, and subduing Lycophron, tyrant of Pheræ, he advanced toward Greece, but his course was stayed at Thermopylæ by the Athenians. The same year Demosthenes delivered the first of his famous orations ("Philippics") against the Macedonian conqueror. Philip took Olynthus in 347, after a war of three years; soon after made peace with the Athenians, conquered Phocis, and closed the Sacred War. In 340 he besieged Perinthus and Byzantium, but the Athenians, aroused by the successive appeals of their great orator, sent an expedition under Phocion, and Philip had to raise the sieges in the following year. But the crisis of Greek independence was at hand; the victory of Chæronea, over the allied Athenians and Thebans, 338, made Philip master of Greece. In 336 he was assassinated at Ægea.

ROME

PHILIP, born in Arabia about 204, and having entered into the military service of the Romans, became prætorian prefect 243. The emperor Gordian was compelled to receive him as a colleague on the throne by the army which had conquered Sapor, King of Persia; and in the following year, 244, Philip assumed the whole authority by putting his rival to death. He was killed in battle by the soldiers of Decius in 249.

GERMANY

PHILIP, the youngest son of Frederick Barbarossa; born in 1178, became king of Suabia and Tuscany after the death of his father, 1190, and emperor after the death of his brother, Henry IV., 1198. He was assassinated in 1208, and succeeded by Otho IV.

FRANCE

PHILIP I., son of Henry I. and Anne of Russia; born in 1052, and succeeded to the throne under the guardianship of Baldwin V., count of Flanders, 1060; died, after a troubled reign, mixed up with the affairs of William the Conqueror, in 1108.

PHILIP II., surnamed Augustus, son of Louis VII. and of Alix, daughter of Thibault, Count of Champagne; born in 1165, succeeded his father 1180, accompanied Richard Cœur de Lion to the Holy Land, 1190, invaded Normandy during Richard's captivity, 1193, confiscated the possessions of King John in France, after the supposed murder of Arthur, 1203, prepared to invade England at the instance of the Pope, 1213, turned his arms against Flanders, and gained the celebrated battle of Bouvines, 1214, and died in 1223.

PHILIP III., called the Hardy, the son of Louis IX. and Margaret of Provence. He was born in 1245, and succeeded his father in 1270. In 1271 he possessed himself of Toulouse; in 1272 he repressed the revolt of Roger, Count of Foix, and in 1276 sustained a war against Alphonso X., King of Castile. The invasion of Sicily by Peter of Aragon, and the massacre of the French, known as the "Sicilian Vespers," caused him to make war against that prince, in the course of which he died in 1285.

PHILIP IV., called the Fair, son of the preceding by his first wife, Isabella of Aragon; born in 1268, and succeeded his father 1285. He was engaged in wars with the English and Flemings, and in a quarrel with the Pope, in the course of which he was excommunicated. In 1303 the States-General were first assembled. In 1312 he suppressed the Templars. He died in 1314.

PHILIP V., called the Long, second son of the preceding; born about 1293, and succeeded to the throne in virtue of the Salic law, which excluded the daughter of his brother Louis X., who died in 1316. In his reign a cruel persecution began against the Jews, in the midst of which he died, in 1322.

PHILIP VI., called De Valois, was son of Charles, Count of Valois, a younger son of Philip the Hardy; born in 1293, and succeeded Charles le Bel, 1328. In his reign occurred the wars with Edward III. of England, who claimed the French crown, as grandson, by his mother, of Philip the Fair. Philip lost the battle of Cressy in 1346, when 30,000 men, and the chief of his nobility, were slain. He died during a truce with the English, in 1350.

SPAIN

PHILIP I., surnamed the Handsome; born in 1478, was the son of Maximilian I., Emperor of Germany; and by his marriage with the heiress of Ferdinand V.,

King of Aragon, and Isabella, Queen of Castile, he obtained the Spanish crown. He died in 1506.

PHILIP II., son of the Emperor Charles V. and Elizabeth of Portugal; born in Valladolid, in 1527. Of a cold and gloomy nature, he was educated by ecclesiastics, and his reign was marked by a crusade against political and religious freedom. He married, in 1543, his cousin Mary of Portugal, who became the mother of Don Carlos, and died in 1545. In 1554 he received from his father the kingdom of Naples, and the same year, after troublesome negotiations, married Mary, Queen of England. He was disliked in England, and soon quitted it. His father gave up to him

PHILIP II. OF SPAIN

the Netherlands in October, 1555, and the kingdom of Spain early in the following year. He declared war on France, and induced Queen Mary to join him; won, by his troops under the Duke of Savoy, the memorable victory of St. Quentin over the French in 1557. He vowed never to witness another battle, and he never did. He vowed also to show his gratitude by building a monastery, which he more than fulfilled in the magnificent Escurial. A second victory over the French at Gravelines, in 1558, was followed by the peace of Cateau-Cambrésis. Immediately on his return to Spain, he began a terrible persecution of "heretics."

The most momentous event of his reign was the revolt of the Netherlands, first excited by his edict against heretics, and attempt to establish the Inquisition there in 1565, and resulting, after years of war, in the establishment of the Dutch Republic. In 1565, he persecuted the Christian Moors of Granada, and provoked a revolt, which began in 1569; and after the greatest atrocities on both sides, ended by the flight or submission of the Moors in 1571. On the death of Henry, King of Portugal, in 1580, Philip conquered that country and annexed it to Spain. He made immense preparations for an invasion of England; and in 1588, the year after Drake's attack on Cadiz, his great fleet, which he named "the Invincible Armada," sailed from Lisbon; but a great storm and contrary winds damaged and threw it into disorder, and it was defeated by the English. It was Philip II. who removed the seat of government from Toledo, and made Madrid the capital of Spain. He died at the Escurial, Sept. 13, 1598.

PHILIP III., son of Philip II. and his fourth wife, Anne Mary, of Austria; born in 1578. He succeeded his father in 1598, and the following year married the Princess Margaret of Austria, by whom he had seven children. He continued the war in the Netherlands; and his general, Spinola, took Ostend in 1604, after a siege of three years. But these successes were too costly, and Philip was compelled to recognize the independence of the United Provinces, and to make a truce with them in 1609. One of the most memorable, and for Spain most disastrous, of his measures was the expulsion of the Moors—industrious farmers and traders, most of them. Whole provinces were depopulated. He died in 1621.

PHILIP IV., son of Philip III. and Margaret; born in Valladolid, in 1605, married Elizabeth, daughter of Henry IV. of France, and succeeded his father in 1621. He chose for his first minister the Count of Olivarez, whose despotic administration brought so many calamities on the kingdom. War was renewed with the Dutch, and only ended at the peace of Westphalia; war with France began in 1635, and lasted till 1659, when the peace of the Pyrénées was concluded, and the Infanta Maria Teresa was married to Louis XIV.; and a formidable revolt broke out in Catalonia, which was finally reduced by Don Juan in 1652. It was in the third year of this reign that the strange visit of Prince Charles of England, with the Duke of Buckingham, to Madrid took place, for the purpose of wooing the Infanta. Portugal threw off the yoke of Spain in 1640, and war followed, which was terminated by the vic-

tory of the Portuguese at Villaviciosa, in June, 1665. This last of the long series of losses and calamities broke Philip's heart, and he died in September of the same year.

PHILIP V., Duke of Anjou, the second son of Louis, dauphin of France, and Mary Anne of Bavaria; born in 1683, assumed the title of King of Spain in 1700, by virtue of the will of Charles II. His claim, however, was contested by the house of Austria, in favor of the Archduke Charles. This introduced the great War of the Spanish Succession, in which Austria was supported against France and Spain by England, Holland, Savoy, Portugal, and Prussia. The beginning of this war was very disastrous to Philip, who lost Aragon, Gibraltar, and the islands of Minorca and Majorca, also Sardinia and the kingdom of Naples. The victories of the Duke de Vendôme, and those of Marshal Villars in Flanders, confirmed Philip on the throne, and restored peace to Europe by the treaty of Utrecht, in 1713. The war was renewed in 1717, and the Spanish fleet was defeated in the Mediterranean by Sir George Byng. Peace was restored in 1720, after which Philip became a victim to confirmed melancholy, and in 1724 abdicated the throne to his son Louis, and retired to a monastery. Louis died a few months after of the smallpox, and Philip was compelled to resume the government. His subsequent conduct was characterized by greater spirit and judgment. In 1733, he entered into an alliance with France against the emperor, and his son Don Carlos conquered Sicily and Naples, of which he became king. In 1736 peace was concluded; but a new war broke out in 1739. He died in 1746.

PHILIP, the sachem of the Wampanoag tribe of Indians, was the second son of Massasoit, who for nearly 40 years had been the first and staunchest ally of the Pilgrim settlers of Plymouth, and had obtained English names for his two sons. In 1661 Philip succeeded his brother, and formally renewed the treaties of his father, which he kept for some years. By 1671, however, goaded by the encroachments of the whites, he had formed a confederation of tribes aggregating nearly 10,000 warriors; and in 1675 what is known as King Philip's War broke out. On the Indian side it was a war of surprises and massacres—13 towns were destroyed, and 600 colonists slain. In December, 1675, Governor Winslow and a force of 1,000 men burned the great fort of the Narragansetts, slew 600 warriors, and massacred 1,000 women and children. In the early summer Philip's squaw and little son were captured, and sold as slaves for the West Indies; and Aug. 12, 1676, at midnight, he and his remaining followers were surprised by Capt. Benjamin Church. Philip was slain and his head cut off.

PHILIP THE BOLD, Duke of Burgundy; born in 1342, was the fourth son of John, King of France. He fought at Poitiers (1356), where, according to Froissart, he acquired the surname of the Bold. He shared his father's captivity in England, and on his return his father made him Duke of Touraine, gave him the Duchy of Burgundy, and made him premier peer of France. During the insanity of Charles VI. he acted as regent, retaining the regency till his death in 1404.

PHILIP THE GOOD, Duke of Burgundy, one of the most powerful sovereigns of his time, son of John "Sans Peur"; born in Dijon, in 1396. He succeeded on the assassination of the duke, his father, 1419, and at once formed an alliance with Henry V. of England, and joined in the treaty of Troyes, which declared Henry regent and heir of France. He fought on the English side for several years, and gave his sister Anne in marriage to the Duke of Bedford. But jealousy and dissension arose, and Philip abandoned the English alliance, and his reconciliation with Charles VII. of France was effected at the great Congress of Arras, 1435, attended by legates of the Pope and the Council of Basle. He had married in 1430, for his third wife, Isabella of Portugal, in whose honor he instituted the Order of the Golden Fleece. Philip extended his dominions by the conquest of Brabant, Holland, and Hainault. Some towns revolted and Dinant was besieged, stormed, burnt to ashes, and all its inhabitants massacred, Philip being present. He died in Bruges, June 15, 1467, and was succeeded by his son, Charles the Bold.

PHILIP I., THE MAGNANIMOUS, Landgrave of Hesse; born in 1504. He began to reign at the age of 14, and introduced the Lutheran religion into Hesse in 1526. In 1527 he founded the University of Marburg, submitted the Confession of Faith at Augsburg in 1530, and in 1531 formed with the Protestant princes the Schmalkalden League. The Emperor Charles V. in 1547, kept him a prisoner for five years. After his return he sent a body of auxiliaries to assist the French Huguenots. He died in 1567.

PHILIPPINE ISLANDS

SCALE OF STATUTE MILES
0 20 40 60 80 100 120 140 160

SCALE OF KILOMETERS
0 40 80 120 160 200 240 280

Capital ⊛ Capitals of Provinces ⊙
Railroads Telegraph Cables
Active Volcanes Dormant Volcanes

A 118° B 120° C 122° D 124° E 126° F

BASHI CHANNEL
NORTH I. YAMI I.
MABUDIS I.
ITBAYAT I. DINEN I.
BATAN ISLANDS
BATAN I.
IBUJOS I. SAPTANG I.
BALINTANG I.
BALINTANG CHANNEL
BABUYAN I.
Vol.
CALAYAN I.
BABUYAN ISLANDS
DALUPIRI I.
IRAO I.
CAMIGUIN I.
FUGA I.

FUGA I. CAMIGUIN I. PALAUI I. C. Engaño C. Bojeador Illyan Pt. Mt. Cagua (Vol.) Cagayan L. Mt. Pucsan Mt. Cresta Palanan Pt. Dipollorin Bay C. Bolinao Lingayen Gulf Dasol Bay Baler Bay Dingalan Bay Polillo Mt. Mafolo Jomalig I. Patnanongan I. Calaguas Is. Lamon Bay Manila Bay Corregidor I. Lubang Is. C. Calavite Mindoro Strait Mt. Halcon Mt. Iraya Mindoro Strait Semirara Is. Culion Group Coron I. Linapacan I. Quinilban Group Cuyos Islands Cuyo I. Dalaganem I. Tay Tay Bay Imuruan Bay Boayan I. Araceli Dumaran San Pablo B. C. Norueste Islas Verdes Bay Initian Honda B. Puerto Princesa Cagayanes Is. Apurahuan Aborlon Victoria Pk. Hummock Pt. Alfonso VIII Mantaquin I. Washington Pt. Mt. Mantalingajan Bonabona San Antonio B. C. Bulalayan Coral Bay Bancalan I. Bugsuk I. Ramos I. Balabac Maeander Reef Tubbataha Is. South Tubbataha Balabac Strait C. Melville Banguey Cagayan Sulu Kudat Labuk Bay Sandakan Borneo Pearl Bank Laparan I. Cap I. Pangutaran Group Pangutaran I. Pandukan I. Jolo Tapul Group Tapul I. Pata I. Siassi I. Sulu Archipelago Tawi Tawi Tawi Tawi Group Sibutu Peak Sibutu I. Sulu Sea Tubbataha Is. Scarborough Shoal Polillo Is. Lamon Bay Calaguas Is. Catanduanes Virac Pandan Lagonoy Gulf Rapu Rapu I. Albay Gulf Burias Sorsogon Donsol Salicuatro Is. Batag I. Palapag C. Espiritu Santo Masbate Ticao Pass Asid Gulf Maripipi I. Biliran Leyte Gulf Leyte Samar Calbayog Catbalogan Borongan Villa Real Lanan Tacloban Balangiga Guian Calicoan I. Suluan I. Malhon I. or Homonhon I. Desolation Pt. Dinagat Siargao Bucas Grande I. Surigao Surigao Str. Bilaa Pt. Mainit L. Gigaquit Cantilan Cauit Pt. Gabarbaran Tandag Port Canay Diuata Mts. Lianga Lianga Bay Hinatuan Hinatuan Bay Linao L. Cabugan L. Bukidnon Mts. Agusan R. Agusan Valley Mindanao Iligan Bay Misamis Oriental Misamis Occidental Lanao Illana Bay Cotabato Davao Gulf Davao Cateel Quinablangan Baganga Caraga Pusan Pt. Mt. Mayo Mati Mayo Bay Pujada B. Luban I. C. San Agustin Mt. Apo (Vol.) Talicud I. Gulf of Davao Mt. Magolo Mt. Malibato Mt. Matutum Banos Pt. Saranggani Bay Saranggani Is. Balut I. Palmas I. Celebes Sea Mindoro Strait Romblon Romblon Group Sibuyan Tablas Strait Panay Capiz Iloilo Strait Guimaras Iloilo Negros Occidental Negros Oriental Tañon Str. Cebu Bohol Siquijor Camiguin I. Dapitan Dapitan Sub District Sindangan Bay Coronado Pt. Basilan Strait Basilan Isabela Zamboanga Sibuco B. Sicogon Bay Sibugay Bay Lutanga I. Bongo I. Dumanquilas Bay Quidapil Pt. Port Lebak Liguasan L. Buluan L. Tuna B. Pola Pt. Bacud Pt. Sarangani Bay Pt. Tinaca Sulu Archipelago Tapul Group Siassi I. Tawi Tawi Group Sibutu Peak Sibutu I. Laguna de Bay Manila Bay Lingayen Gulf Dasol Bay Subic B. Balayan Bay Tayabas Bay Lamon Bay Ragay Gulf Lagonoy Gulf Albay Gulf Asid Gulf Ticao Pass Leyte Gulf San Bernardino Str. Surigao Str. Tañon Str. Iloilo Strait Guimaras Strait Negros Occidental Negros Oriental Bohol Sea Sulu Sea Celebes Sea Philippine Sea

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PHILIPHAUGH, on Yarrow Water, 3 miles W. S. W. of Selkirk, Scotland, the property from 1461 till 1889 of the line of the "Outlaw Murray" of the ballad. Here, Sept. 13, 1645, Montrose was defeated by David Leslie, who butchered more than 100 Irish prisoners.

PHILIPPA, QUEEN, daughter of the Earl of Hainault; married to Edward III. of England in 1328. She accompanied Edward in some of his foreign expeditions, and at other times defended the kingdom in his absence.

PHILIPPEVILLE, a seaport of Algeria, the harbor of Constantine, from which it lies distant 54 miles N. N. E. There is a magnificent harbor (1882) protected by two moles, one 4,590 feet long, the other 1,310 feet. The town is quite new, having been built since 1838 on the site of the ancient Rusicada. Pop. about 30,000.

PHILIPPI, a city of Macedonia; named after Philip II. of Macedon, who enlarged it because of the gold mines in its neighborhood. It is famous on account of the two battles fought in 42 B. C. between Antony and Octavianus on the one side and the republicans under Brutus and Cassius on the other, in the second of which the republic finally perished. The apostle Paul founded a Christian church here, to which one of his epistles is addressed.

PHILIPPIAN, of or pertaining to PHILIPPI (*q. v.*), or its inhabitants; also a native or inhabitant of Philippi. The Epistle of Paul the apostle to the Philippians, an epistle addressed by St. Paul, in conjunction with Timothy, "to all the saints in Christ Jesus which are at Philippi, with the bishops and deacons."

PHILIPPIC, the title of several orations of Demosthenes against Philip, King of Macedon, the spirit and animosity of which caused the name to be transferred to similar compositions by other orators.

PHILIPPINE ISLANDS, a group of islands, a possession of the United States, forming a part of the Eastern Archipelago. They extend between lat. 21° 10′ and 4° 40′ north, 116° 40′ and 126° 34′ east. The total length is about 1150 statute miles, and the width about 650 miles.

There are over 3,100 islands, of which 1,473 are without names. The largest islands are Luzon, 40,969 square miles; Mindanao, 36,292 square miles; Samar, 5,031 square miles; Negros, 4,881 square miles; Panay, 4,611 square miles; Palawan, 4,027 square miles; and Mindoro, 3,851 square miles.

Topography.—The topography of the islands is varied. Nearly all are heavily wooded and most of them are traversed by mountain ranges. The two largest islands, Luzon and Mindanao, have broad plains and level valleys. The east coast of Luzon is bordered for 350 miles by a high mountain range, the Sierra Madre. West of this is the fertile valley of Cagayan river, where the largest part of the tobacco is grown.

Climate.—The climate of the archipelago is warm, as it lies entirely within the tropics. Northeast trade winds prevail from November to June, and the east coasts have a heavy rainfall. The temperature does not vary greatly during the day. There are frequent cyclonic storms of wind and rain which are known as typhoons. These frequently do great damage.

Agriculture.—There are great possibilities for agriculture and these have been greatly developed during the American occupation. The chief products are rice, abaca, sugar, coconuts, corn, and tobacco. The year 1918 was the best yet experienced in the agricultural industry. The total value of the leading crops was about 350,000,000 pesos (a peso equals $.50).

Commerce.—The commerce of the islands has greatly increased in recent years. The trade for 1919 exceeded that of any other year. Imports were valued at $107,774,263, which was about 30 per cent. more than in 1918, and about double the average before the World War. The chief imports were of machinery, cotton, textiles, and rice. The exports for 1919 were valued at $122,729,238, an increase of about $6,000,000 over the value of the exports for 1918. The remarkable development of the coconut oil manufacturing industry was the chief feature of trade in 1918. The sugar trade of the island was benefited greatly by post-war conditions. The average figure received per pound was 4.3 cents. Of the total foreign trade, imports from the United States were valued at $64,645,144, and the exports to the United States at $79,333,548.

Mineral Resources.—The islands are rich in minerals, but so far the product has not been greatly developed. Over one hundred mineral species and varieties have been classified. Coal and gold have been found in nearly every island so far investigated. The total gold production is valued at over $1,000,000 yearly. Great quantities of coal are known to exist, but its deposits have not yet been exploited. Iron is produced to a small extent. Other minerals which occur are Portland cement, asbestos, gypsum, pe-

troleum, salt, stone, sulphur, asphalt and gravel.

Education.—Under American rule education has been fostered and there has been great improvement in the conditions. There were in 1918, 4,747 schools in the islands. There was an annual enrollment of 671,398, an average monthly enrollment of 569,475 and an average daily attendance of 521,377.

Special attention has been given to vocational education and nearly every community of any size is provided with facilities for teaching useful trades to the natives.

Health and Sanitation.—Prior to American occupation sanitary conditions were extremely bad. Vigorous steps were taken at once to remedy these and the results have been marked. In spite of the improved condition there are frequent epidemics which kill large numbers of people. In 1919 there were an especially large number of these. Over 13,000 deaths occurred from small-pox, which was brought from Manila in December, 1917, by sailors. During the same year there were two epidemics of influenza which resulted in the deaths of many people. Cholera also appeared in several provinces during the year, but it was confined to a comparatively small area. Six provinces have been organized into sanitary divisions and only seven provinces remain to be organized. Special attention is given to the health of children. Dispensaries and nurses are maintained to instruct mothers in the care of their children.

Finance.—The expenditure for government in 1918 amounted to 57,496,043 pesos, and the receipts were 86,690,105 pesos. The budget estimate was introduced in 1917. The total amount of money in circulation at the end of 1918 was 131,151,883 pesos. There are on the islands four banks which engage in general banking business. Their combined capital is about three million dollars. The government supports an agricultural bank and postal savings system. These have both been successful.

Religion.—The greater number of people are Roman Catholic. Absolute freedom of worship is guaranteed by the terms of the treaty of peace with Spain made in 1898. Several of the tribes, including the Moros in the south, are pagan.

Government.—The authority of the United States is administered by a governor-general. A complete civil central government was established in 1901, which includes four executive departments in charge of secretaries. The work of these is divided into a number of bureaus. Several important measures relating to the administration of the government have been passed since American occupation. An act of 1902 provided for the creation of a legislative lower house called the assembly. An upper house also was created and the two together formed the Philippine Legislature. The Assembly is composed of elected members from the regularly organized provinces, according to their population. The judicial system is also established, corresponding practically to the system in the United States.

History.—The Philippines were discovered and visited by Spanish and Portuguese explorers. Magellan discovered in March 15, 1521, a group of islands which he named after St. Lazarus. This explorer lost his life in a skirmish with the natives a few weeks later on Maetan Island, near Cebu. The islands were taken into possession by Spain in 1565, and five years following the conquest of Luzon was carried on. In 1571 Manila was founded and rapidly became the seat of Spanish power. The Spaniards remained in possession of the islands practically undisturbed until the Spanish-American War. They made little progress in economic development and their methods with the natives resulted in bitter feeling which gave rise to several attempts to secure independence. The most important of these was that under José Rizal, in 1896. This attempt was put down and conditions were still in a threatening state when the United States went to war with Spain over the independence of Cuba. A fleet under Admiral Dewey was sent at once to the Philippines and the city was surrendered after a brief bombardment on May 17, 1898.

By the treaty of peace with Spain signed on Dec. 10, 1898, the entire archipelago was ceded to the United States. On June 12th, however, an insurrection broke out headed by Emilio Aguinaldo, who proclaimed the independence of the Philippine Islands. This resulted in a protracted series of operations in which Aguinaldo was finally captured on March 23, 1901. This put an end to active opposition, although it was necessary to pacify the islands by a series of expeditions, some of which resulted in considerable losses to American troops. Peace was finally brought about. The first session of the Philippine Legislature was held on Oct. 15, 1907. Although peace has prevailed in the islands there has been a very definite attempt to bring about their independence by peaceful means, and by propaganda carried on both in the Phil-

ippines and in the United States. The American Congress has expressed a desire to give their independence to the Filipinos when they had reached a stage of development which would justify it. Native leaders who desire the independence urge that this point has already been reached.

On the whole, the people of the islands have been satisfied with American rule. They have reached the point of economic and intellectual development which they failed to achieve during the hundreds of years of Spanish domination. During the World War a regiment was organized and although it was not called upon for active service it was ready to give such services if they were needed.

Population.—The last census of the islands was taken in 1918, when the population was 10,350,640. Of these about 8,500,000 are Christians, 316,000 Mohammedan, and 620,000 pagan. The population of Manila, the chief city, in 1918, was 283,613, of whom 245,500 were Filipinos. Exclusive of the Army and Navy, there are about 5,000 Americans in the islands, chiefly in Manila.

PHILIPPIUM, an element closely allied to cerium. Though described by Delafontain in 1888 as a newly discovered element, it was not till 1897 that it was acknowledged to be such by English chemists. Philippium has been found in gadolinite, samarskite and fergusonite.

PHILIPPOPOLIS, Bulgaria, on the navigable Maritza; 110 miles W. by N. of Adrianople. It manufactures silk, cotton, tobacco, leather, etc., and prepares and exports attar of roses. An outpost of the Macedonian kingdom, it was ruined by the Goths, captured by the Turks (1363), destroyed by an earthquake (1818), burned (1846), and occupied by the Russians 1878. Pop. about 50,000, of whom nearly half are Turks, Greeks, and others than Bulgarians.

PHILISTINES, an ancient people, descended from Ham, the son of Noah. They emigrated at a very early date from Egypt into Syria, called after them Philistia, and afterward Palestine, though they possessed only the portion on the S. coast bounded by the hilly countries of Ephraim and Judah, and extending S. W. to the confines of Egypt. Their chief city, Gaza, is mentioned as early as 2218 B. C. They reduced the Israelites to subjection 1156 B. C. (Judges xiii: 1), but were compelled to set them at liberty by Samson, who destroyed their chief nobility by pulling down the temple where they were assembled, 1117 B. C. (Judges xvi: 30). In the time of Eli, 1116 B. C. (I Sam. iv: 11), they seized the ark of the Lord, which they were compelled to restore by the miraculous plagues it brought upon them; and they sustained a severe defeat from Samuel at Mizpeh, 1096 B. C. (I Sam. vii: 2–13). In the reign of Saul they harassed the Israelites (I Sam. xiv: 52), and the death of that monarch occurred while fighting against them in Mount Gilboa, 1055 B. C. (1 Sam. xxxi: 4). David gained several victories over the Philistines, and Jehoshaphat made them tributary to him, 912 B. C. (II Chron. xvii: 11). In the reign of Jehoram they invaded Judah, and carried away the king's wives and sons into captivity, 887 B. C. (II Chron. xxi: 17). They again invaded Judah, and took Bethshemesh and Ajalon, 740 B. C. (II Chron. xxviii: 18). Their country was invaded by the Assyrians and the Egyptians, who took their strong city of Ashdod. Pompey incorporated Philistia in the Roman province of Syria, 62 B. C.

PHILLIPS, DAVID GRAHAM, an American newspaper man and novelist. Born in 1867 in Madison, Ind., and graduated from Princeton at twenty years of age. He soon became a reporter on the staff of the New York "Sun." For a few years he was the private secretary of Joseph Pulitzer, the owner and founder of the "World." He also became the London correspondent of that newspaper, and later one of its chief editorial writers. In 1901, with the publication of his first novel he ceased newspaper work to give himself up entirely to the writing of novels, dealing mainly with pressing social and ethical problems. He was killed by a lunatic on Jan. 24, 1911. Among the best of his novels are: "The Hungry Heart" (1909); "The Second Generation" (1907); "The Fortune Hunter" (1906); "The Worth of a Woman" (1908).

PHILLIPS, STEPHEN, an English poet. Born at Oxford in 1868; entered Queen's College, Cambridge, in 1886. For a few years he joined a company of players and played in Shakespearean drama, playing in the Globe Theater in London as well as in other large cities of England. After leaving the stage he turned to literature. In 1890 appeared a volume of verse, "Primavera." In the few succeeding years appeared "Christ in Hades," and a volume entitled "Poems" which contained "Marpessa," which in some respects is his best work. These volumes won him the prize from the London Academy for the best verse of the year. Phillips also wrote some dramas, the most famous of which are: "Ulysses"

(1902); "Herod" (1900); "Paolo and Francesca" (1899); "Pietro of Siena" (1910); "Armageddon" (1915). This was the last work of Stephen Phillips. He died in 1915.

PHILLIPS, WENDELL, an American orator and abolitionist; born in Boston, Mass., Nov. 29, 1811. He was graduated at Harvard in 1831, studied law there, and was called to the bar in 1834. A timely speech in Faneuil Hall in 1837 made him at once the principal orator of the anti-slavery party, and henceforth,

WENDELL PHILLIPS

till the President's proclamation of Jan. 1, 1863, he was Garrison's loyal and valued ally. He also championed the cause of temperance, and that of women, and the rights of the Indians. In 1870 he was nominated governor by the Prohibitionists and the Labor party. His speeches and letters were collected in 1863 (new ed. 1884). He died in Boston, Mass., Feb. 2, 1884.

For his life see "Wendell Phillips, Orator and Agitator" (New York, 1909).

PHILLIPS ACADEMY, a school for boys located at Andover, Mass., and often called Phillips Andover. The school was chartered in 1780 and was founded as the result of a gift by the Phillips family. In 1901 an archæological department was added as the gift of two members of the alumni. The endowment is a large one, being close to two million dollars, while the grounds, buildings and equipment are valued at nearly three million. The work is entirely college-preparatory; Yale and Harvard being the colleges most frequently selected by the students. Among its alumni have been some of the famous names of American history.

PHILLIPSBURG, a city in Warren co., N. J., on the Delaware river, and on the Lackawanna, the Lehigh Valley, the Central of New Jersey, and the Pennsylvania railroads; 50 miles N. N. W. of Trenton. Two fine railroad bridges cross the river here and connect with Easton, Pa. Phillipsburg is in a limestone and iron-ore region; has several iron foundries, machine shops, railroad shops, a rolling mill, and manufactories of boilers, locomotives, mowers and reapers, and a pop. (1910) 13,903; (1920) 16,923.

PHILLIPS EXETER ACADEMY, a boys' school located at Exeter, New Hampshire, and commonly called Phillips Exeter. Like Phillips Andover, it was founded by a gift from the Phillips family and was opened for students in 1781. The alumni by 1920 numbered over 11,000. Among the early alumni were Jared Sparks, Daniel Webster, Edward Everett and George Bancroft. The enrollment in 1914–1915 was 573. The course is college-preparatory for the New England colleges. The school is very well equipped with modern school buildings, laboratories, gymnasium, etc., the total value of which exceeds a million dollars, while the endowment is about $500,000.

PHILLPOTTS, EDEN, an English novelist, born in India in 1862. He was educated at Plymouth, England, and at the age of eighteen became a clerk in an insurance office, a position which he held for ten years. His first published novel was "Lying Prophets," 1896. This was followed in regular succession by a large number of books, mostly depicting Devonshire life. His works include "Sons of the Morning" (1900); "The Good Red Earth" (1901); "The Secret Woman" (1905); "The Forest on the Hill" (1912); and "Brunel's Tower" (1915). He also published several plays.

PHILOLOGY, in a popular sense: (1) Etymology, or the science of the origin of words. (2) Grammar, or the science of the construction of language in general and of individual languages. (3) Literary criticism, or the investigation of merits and demerits in style and diction. Of late years, however, a new and very extensive province has been added to the

domain of philology. The term comprehends: (1) Phonology, or the knowledge of the sounds of the human voice; which appears to include orthography, or the system to be adopted when we endeavor to render, by our own alphabet, the sounds of a foreign language; (2) Etymology; (3) Ideology, or the science of the modification of language by grammatical forms, according to the various points of view from which men contemplate the ideas which words are meant to express.

PHILOLOGICAL ASSOCIATION, AMERICAN, a society whose object is the advancement of the study of philology. Founded in 1869, at Poughkeepsie, N. Y., under the leadership of Prof. William D. Whitney of Yale University. The original members were from the classical section of the Oriental Society. It has annual meetings in different cities of the United States and publishes its "Proceedings" or annual minutes of these meetings. In addition to these the Association publishes the "Transactions" which are composed of learned papers on philology submitted to the society and selected by the executive committee.

PHILOPŒMEN, called the last of the Greeks, really their last great commander. He was born in Arcadia, 253 B. C., became in 210, generalissimo of the Achaian League, and conquered the Spartans. The greatest of his victories in this long struggle was the battle of Mantinea. He was put to death by poison when a prisoner of the Messenians, 183 B. C.

PHILOSOPHICAL SOCIETY, AMERICAN, a learned society, the oldest now existing in America, being founded as early as the year 1727. At that time it was merely a club in Philadelphia where learned men repaired for conversation, and among them Benjamin Franklin. In 1743 Franklin wrote "A Proposal for Promoting Useful Knowledge Among the British Plantations in America," in which he advocated the formation of a society with members from all the colonies. The society was formed the next year under the title of American Philosophical Society Held at Philadelphia for Promoting Useful Knowledge. Franklin was the first president and he was succeeded by David Rittenhouse and then by Thomas Jefferson. The present society is the result of a merger of two learned societies both situated in Philadelphia. In 1785 a London gentleman, de Magellan, presented 200 guineas to the society the interest on which was to be used to provide a gold medal to be awarded for the best discovery or improvement in navigation, natural history, or astronomy. The medal is considered a great honor among scientists.

Membership in the society is limited to fifteen new members each year from the United States and three from foreign countries. The hall of the Society is located at 104 S. Fifth St., Philadelphia, where there are interesting scientific collections, and many objects of great historical interest.

PHILOSOPHY, a term said by Diogenes Laertius to have been suggested by Pythagoras, who, on being complimented on his wisdom, said that he was not wise, but a lover of wisdom (*philos sophia*), the Deity alone being wise. Philosophy, while earnest in amassing knowledge, aimed chiefly at penetrating to the principles of things. Popularly, it is divided into natural and mental philosophy, the former investigating the physical laws of nature, the latter those regulating the human mind. The term philosophy is now generally restricted to the second of these. Even as thus reduced it has a very wide sphere. Thus, there is a philosophy of history (see HISTORY). All the nations of antiquity had a philosophy, that of the Greeks being specially celebrated. The chief schools were: The Pythagorean, commenced about 500 B. C.; the Platonic 374 B. C.; the Peripatetic, 334 B. C.; the Sceptic, 334 B. C.; the Cynic, 330 B. C.; the Epicurean, 306 B. C.; the Stoic, 280 B. C.; the Middle Academy, 278 B. C.; the New Academy, 160 B. C.; the New Platonists, A. D. 200 (?). Of modern systems the perceptive and sensational philosophy of Locke arose about 1690; the idealistic of Berkeley and Hume, 1710; the common-sense philosophy of Reid, etc., 1750; the transcendental of Kant, 1770; the scientific philosophy of Fichte, 1800; the idealistic philosophy of Hegel in 1810; the positive philosophy of Comte in 1830, and the evolutionary philosophy of Herbert Spencer in 1852, or more decidedly in 1855. Also the course of sciences read in the schools, and required for the degree of Doctor of Philosophy in the universities of Germany, etc., and corresponding to Arts in the United States.

For more modern philosophy consult the works of James, Royce, Bergson, Von Mach, Sidgwick, Taylor, etc.

PHILOSOPHY, FATHER OF. See THALES.

PHILTER, a potion supposed to have the power of exciting love. At times, poisonous drugs were employed, the death of Lucretius and the madness of Caligula being alike ascribed to philters administered by their wives.

PHIPPS, HENRY, an American manufacturer and philanthropist. Born in Philadelphia in 1839; educated in the public schools of Allegheny City, Pa. In the early years of his life he worked in stores in Pittsburgh and later became partner in a small iron mill. Some years afterward he became associated with Andrew Carnegie in the steel business and built up an enormous fortune. Interested in the fight on tuberculosis he donated the Phipps Institution with approximately a million dollars to the University of Pennsylvania. To Johns Hopkins University he gave a psychiatric clinic and endowment for maintenance.

PHIPS, or **PHIPPS, SIR WILLIAM,** governor of Massachusetts; born in Pemmaquid (Bristol), Me., Feb. 2, 1651. He was successively a shepherd, a carpenter, and a trader, and in 1687 recovered from a wrecked Spanish ship off the Bahamas bullion, plate, and treasure valued at $1,500,000; this gained him a knighthood and the appointment of sheriff of New England. In 1690 he captured Port Royal (now Annapolis) in Nova Scotia, but failed in the same year in a naval attack on Quebec. In 1692, through the influence of Increase Mather, he was appointed governor of Massachusetts. He at once put a stop to the witchcraft persecutions by appointing a commission of seven magistrates to try all such cases. He died Feb. 18, 1694, in London, England, whither he had been summoned to answer certain charges of arbitrary conduct.

PHIZ. See **BROWNE, HABLOT KNIGHT.**

PHLEBITIS, inflammation of the veins. Though seldom an original or "idiopathic" disease, it is a frequent sequence of wounds, and is not uncommon after delivery. The disease is indicated by great tenderness and pain along the course of the affected vessel, which feels like a hard knotted cord, and rolls under the fingers.

PHLEBOTOMY, or **VENESECTION,** the act of letting blood by opening a vein; a method of treatment formerly applied to almost all diseases, but now chiefly confined to cases of general or local plethora. Another mode of letting blood is by cupping or by the application of leeches. It has been one of the processes of the medical profession from the earliest times.

PHLOGISTON, a substance supposed by the earlier chemists to exist in all combustible matters, and to the escape of this principle from any compound the phenomenon of fire was attributed. The views held regarding it were, however, abandoned by chemists some time after the researches of Lavoisier on combustion were made.

PHLOX, a genus of plants of the natural order *Polemoniaceæ,* distinguished by a prismatic calyx, salver-shaped corolla, and unequal filaments. The species are pretty numerous, mostly perennial plants with simple leaves, and mostly natives of North America. A number of species are common in British flower-gardens.

PHOCÆA, an Ionian city, in Asia Minor, originally a colony from Athens. It stood on a peninsula between the gulfs of Elais and Smyrna, and had an excellent harbor; and the Phocæans were distinguished among the Greeks for their nautical enterprise. When the city was besieged by the Persians in the time of Cyrus, many of its inhabitants emigrated to Corsica; Massilia (Marseilles) was a Phocæan colony. The ruins of Phocæa are still known as Karadscha Tokia.

PHOCAS, Emperor of the East, at first a centurion in the army of the Emperor Maurice. In 602 he took advantage of the grievances and discontent of the soldiers to get himself elected emperor; a revolt at Constantinople followed, and Maurice and his five sons were murdered at Chalcedon. Phocas was of low origin; ignorant, cowardly, and cruel. The Empress Constantina, accused of conspiracy, was tortured, and with her three daughters beheaded at Chalcedon; and numberless meaner victims perished. Yet Phocas was acknowledged both in the East and West. Chosroes, King of Persia, declared war on him, and at length the tyrant was overthrown and the empire delivered by Heraclius, son of the Exarch of Africa, who led an expedition to Constantinople in 610. Phocas was seized, put in chains, tortured, and beheaded, and his body burned.

PHOCION, an Athenian general and statesman; born about 400 B. C. He was a disciple of Plato and Xenocrates, served under Chabrias at the naval battle of Naxos, and became subsequently head of the peace party at Athens, steadily opposing Demosthenes and all bold patriots who were ready to fight for the independence of their country against the Macedonian invaders. He was a brave and successful soldier; his private character was above suspicion, which saved him from the infamy which his political course deserved. He was twice sent on embassies to Alexander the Great, and acquired his friendship. When Athens was occupied by Polysperchon, Phocion

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THE ARRIVAL OF GENERAL JOHN J. PERSHING IN FRANCE, JUNE 12, 1917

Enc. Vol. 7—p. 228

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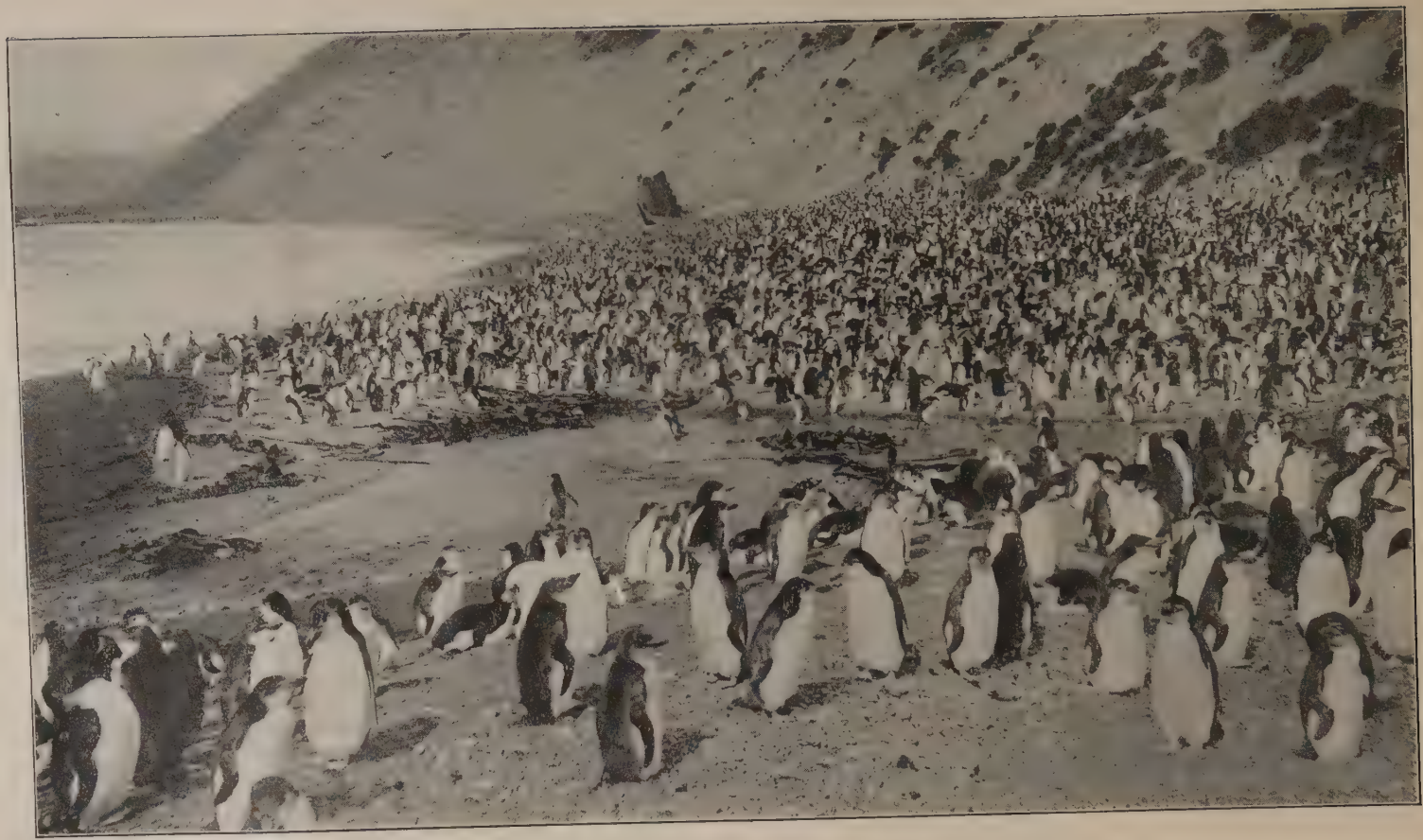
GATHERING THE PEACH CROP FROM AN ORCHARD IN NEW JERSEY



©Sir Douglas Mawson

PENGUINS ENJOYING AN ANTARCTIC BEACH

Photo by Ewing Galloway

A VIEW OF SCRANTON, PA., SHOWING THE SKYSCRAPERS OF THE NEW SKY LINE

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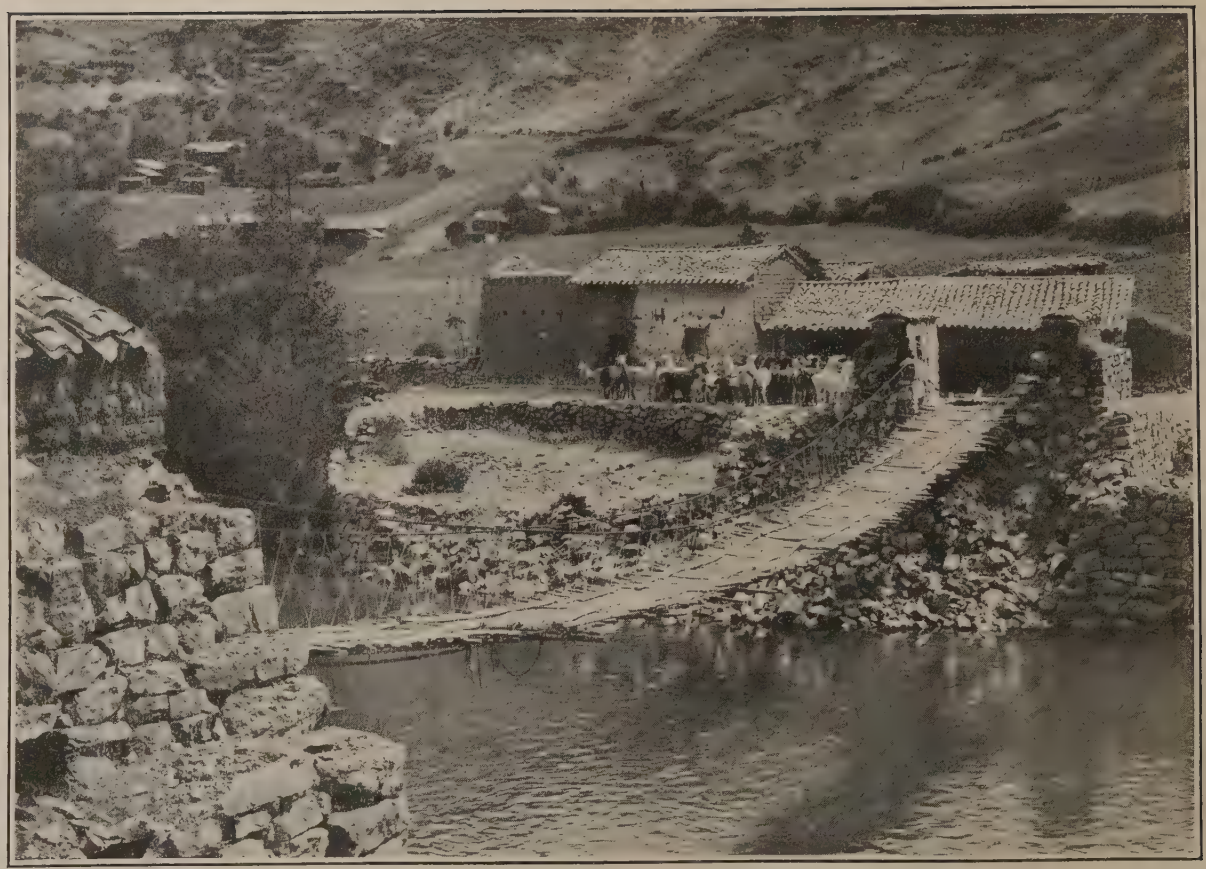
AN INDIAN GIRL GATHERING PAPAYAS IN THE INTERIOR OF PERU



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AN OLD SWINGING BRIDGE OVER THE HUARI RIVER IN PERU, SOUTH AMERICA

©E. M. Newman

A COUNTRY HOUSE IN THE PHILIPPINES, TYPICAL OF THE NATIVE FILIPINOS

©*Ewing Galloway*

SOUTH BROAD STREET, PHILADELPHIA, LOOKING NORTH TOWARD THE CITY HALL

fell one of the first victims to the enemies of his country whom he had aided. He was tried and sentenced to death, 317 B. C.

PHOCIS, a division of central Greece until the Turkish War (1912) and with Bulgaria (1913). Now forms with Phthiotis a department. Pop. (1911) 174,574. The greater part of the country is occupied by the mountain range of PARNASSUS (*q. v.*). The state derives its chief historical importance from possessing the famous oracle of Delphi. During the Peloponnesian war the Phocians were close allies of the Athenians. In the time of Philip of Macedon they were involved in a 10 years' war, commonly known as the Sacred or Phocian War, which ended disastrously for the Phocians, the whole of whose cities (22 in number) were destroyed, with one exception, and the inhabitants parceled out among the hamlets.

PHŒBUS (*i. e.*, "the Bright"), an epithet, and subsequently a name, of Apollo. It had reference both to the youthful beauty of the god and to the radiance of the sun, when, latterly, Apollo became identified with Helios, the sun god.

PHŒNICIA, in ancient geography, in the largest sense, a narrow strip of country extending nearly the whole length of the E. coast of the Mediterranean Sea, from Antioch to the borders of Egypt. But Phœnicia proper was included between the cities of Laodicea, in Syria, and Tyre, comprehending mainly the territories of Tyre and Sidon, and forming then only a part of the country of Canaan. Before Joshua conquered Palestine, this country was possessed by Canaanites, sons of Ham, divided into 11 families, of which the most powerful was that of Canaan, the founder of Sidon, and head of the Canaanites, whom the Greeks named Phœnicians. A colony of Phœnicians, led by Elissa or Dido, settled in Africa 878 B. C., and founded CARTHAGE (*q. v.*). Phœnicia was invaded by Shalmaneser IV., King of Assyria 723 B. C.; by Nebuchadnezzar, King of Babylon, 587 B. C.; and by Cyrus, King of Persia, 536 B. C. The Phœnicians subsequently assisted the Persians in their wars with the Greeks, and sustained a total defeat from Cimon, at the naval battle of the Eurymedon, 466 B. C. They revolted from Persia 352 B. C., and were conquered by Alexander III. (the Great) 331 B. C. After his death, 323 B. C., Phœnicia was annexed to the dominions of Ptolemy (I.) Soter, King of Egypt. It was seized by Antigonus of Phrygia, 315 B. C., and passed under the protectorate of Tigranes I., King of Armenia, 83 B. C. It formed part of the Roman province of Syria 62 B. C., and was deprived of all its liberties by Augustus, 20 B. C.

PHŒNIX, or **PHENIX**, in astronomy, one of the constellations of the Southern Hemisphere, N. of the bright star Achernar in Eridanus. In botany, the typical genus of the family *Phœnicidæ*. Habitat, northern Africa and southern Asia. Known species about 12. *P. dactylifera* is the date palm. *P. sylvestris* is the wild date, a tree very common, both wild and cultivated, in India. The fibrous leaflets and the fibers from the petioles are manufactured into mats, ropes, and baskets; sugar is made from the sap of the tree. The juice of *P. furinifera*, a small species in sandy parts of India, yields sago; its leaves are used in mat making, and those of *P. paludosa*, which grows in the Sunderbunds, for rough ropes and thatching. The fruit of *P. acaulis*, a stemless species from the Sub-Himalayas and central India, is eaten by the natives. In entomology, *Cidaria ribesaria*, a geometer moth, the larva of which feeds on currant and gooseberry bushes. In mythology, a fabulous female bird of Arabia, which was feigned to live for 500 or 600 years in the desert, when she built for herself a funeral pyre of wood and aromatic gums, to which she set fire by the fanning of her wings, and so consumed herself; but from the ashes she sprang up again in youth and freshness. Hence the phœnix is depicted as an emblem of immortality. In heraldry the bird is represented in coat-armor in flames. Figuratively, a paragon; a person or thing of extreme rarity or excellence.

PHOENIX, a city of Arizona, the capital of the State and the county-seat of Maricopa co. It is on the Maricopa and Phoenix and the Santa Fé, Prescott, and Phoenix railroads. It is the site of the Agricultural Experiment Station. Among its important buildings are the capitol, Federal Building, city hall, court house and handsome school buildings. The city has important commercial interests and has an extensive trade in live stock, grain, fruits, hay, honey and olives. Pop. (1910) 11,134; (1920) 29,053.

PHOENIXVILLE, a town in Chester co., Pa., at the confluence of French creek and the Schuylkill river, and on the Pennsylvania and the Philadelphia and Reading railroads; 23 miles N. W. of Philadelphia. Here are a seminary, several banks, many schools, bridge works, silk mill, steel mills, etc. Phœnixville

also has manufactories of copper and cotton goods. The assessed valuation is $3,500,000. Pop. (1910) 10,734; (1920) 10,484.

PHOLAS, piddock; the typical genus of the *Pholadidæ*. Shell long, cylindrical, accessory valves protecting the dorsal margin. Animal with a large, truncated foot, body with a fan-like termination. They live in symmetrical vertical burrows. Recent species 32, from most seas: fossil 25, from the Upper Lias onward.

PHONETIC, or **PHONETICAL**, representing sound; pertaining to the representation of sounds; a term applied to alphabetic or literal characters which represent sounds, as a, b, c; as opposed to ideographic, which represent objects or symbolize abstract ideas, as in Egyptian hieroglyphics. Phonetic spelling, a system of spelling in which the words are spelled exactly as they are pronounced, the sounds being represented by characters each of which represents a single sound. Phonetic printing was first suggested by Isaac Pitman, of Bath, England, and reduced to a system by him in conjunction with A. J. Ellis, in the years 1843–1846. Since that time many systems of phonetic spelling have been proposed and several are used by stenographers in the United States.

PHONOGRAPH, an instrument for recording and reproducing sound. The instrument in its present stage of perfection has been evolved through extended laboratory work from the first principles that were demonstrated by a device invented in 1855 by Leon Scott. In Scott's instrument sound was collected by an ellipsoidal receiver, which was open at one end. A small tube was fastened to the other end of the receiver and a tightly stretched membrane to which a bristle was attached was fastened to the end of the tube. In front of the bristle was a cylinder surfaced with material sufficiently soft to take impressions from the bristle as the sound waves collected in the receiver caused the membrane to move the bristle; and at the same time the cylinder was made to move so that a record of the vibrations was made upon the soft surface of the cylinder.

In 1877 Charles Crass placed before the French Academy of Sciences a method of reproducing the fragile first cylinder by photoengraving on some harder surface and König of Paris made many changes and improvements on Scott's first machine.

Because of the great possibilities suggested by the early laboratory models Thomas A. Edison started an intensive study of this field about 1877 and the real life of the phonograph began, although his efforts were not concentrated in this field until a later date, and the machine to-day is a result of constant laboratory experimentation and improvement.

Other names that should be mentioned in the development of the instrument are Bell and Tainter, who in 1885 invented the gramophone or machine which used a wax cylinder and a horizontal groove, and Emil Berliner who introduced the disk record in which the record of vibrations was made in the horizontal in place of the vertical plane.

The modern machine consists essentially of a reproducer in which a metal stylus or jeweled point transmits the vibrations to some tightly stretched surface; the vibrations are carried through an arm to a tone chamber. The record is revolved by a turntable which is accuated either by clockwork or an electric motor.

The fact that the early records, which were made of a composition which had wax as its principal ingredient, were fragile and would not wear well, led to experiments which would produce a more durable material. A method in which the original record is electro-plated with gold and re-enforced with a less valuable material and used as a die which stamps the records into a plastic material which is afterward hardened is now used.

Almost every musical artist of note is under contract by one of the companies manufacturing phonograph records, and the industry of making phonographs and records has grown to tremendous size; many thousands of people are employed in the making, and a vast staff of research workers are engaged in making studies which tend toward the improvement of the product. See GRAMOPHONE.

PHONOGRAPHY, a description of the sounds uttered by the organs of speech. Also the representation of sounds by certain characters, each of which represents one sound, and always the same sound. Its special application is to alphabetical writing, in which sounds or articulations are represented by signs or letters, as opposed to the system in which the representation is by ideas, symbols, or cipher. Specifically, a method of writing, or graphically representing language, invented by Isaac Pitman, of Bath, England. See SHORTHAND. Also the art of using, or registering by means of, the phonograph; the construction of phonographs.

PHOSGENE, carbon oxychloride, carbonyl chloride, chlorocarbonic acid, C O

Cl_2. A colorless liquid, occurring as a gas at ordinary temperatures. Boiling point 8·2 C., specific gravity 1·432 at 0° C. Soluble in acetic acid and benzine. In contact with moisture it decomposes, forming carbon dioxide and hydrochloric acid.

$$CO\,Cl_2 + H_2O = CO_2 + 2\,HCl$$

Combines with ammonia to form urea and ammonium chloride. Prepared by passing carbon monoxide and chlorine through charcoal with or without a catalyst. It is a very poisonous, asphyxiating gas at temperatures above its boiling point, and this property was made use of in the World War, phosgene being used as a filling for shells, usually in combination with other gases. It is also used for bleaching sand employed in glass manufacture, and in the preparation of dye stuffs.

PHOSPHATE, in chemistry, the generic term for the salts formed by the union of phosphoric anhydride with bases or water or both. They play a leading part in the chemistry of animal and plant life, the most important in this connection being the phosphate of soda, phosphate of lime, and the basic phosphate of magnesia. In agriculture the adequate supply of phosphates to plants in the form of manures becomes a matter of necessity in all deplenished soils. These phosphatic manures consist for the most part of bones, ground bones, mineral phosphates, bone ash and phosphatic guano.

PHOSPHORESCENCE, the property which many substances and organic beings possess of emitting light under certain conditions; also a phosphoric light. Among animals, some of Cuvier's subkingdom Radiata have the power of emitting light in the dark, and the phosphorescence of the sea in tropical, and even at times in temperate climates, is attributed to a small infusorial animalcule. On land, of insects, some millipedes, the female glow-worm, and the fireflies, emit light. In the glow-worm the light is from the under side of the final segments of the abdomen.

PHOSPHORIC ACID, in chemistry, H_3PO_4, ortho-phosphoric acid, a tribasic acid formed by the action of nitric acid upon phosphorus, or by the hydration of phosphoric anhydride. It is given in a very dilute state in diabetes and scrofula.

PHOSPHORITE, a species of calcareous earth; a sub-species of apatite. It is an amorphous phosphate of lime, and is valuable as a fertilizer.

PHOSPHOROUS ACID, in chemistry, H_3PO_3. Prepared by adding water to the trichloride of phosphorus, $PCl_3 + H_2O = H_3PO_3 + 3HCl$. Heated in a close vessel, it forms phosphoreted hydrogen and phosphoric acid.

PHOSPHORUS, in Greek mythology, the morning-star; Phosphor. In chemistry, symbol P; at. wt.= 31, a non-metallic pentad element; found in a state of combination in the unstratified rocks, the soil, the organism of plants, and the bodies of animals. Discovered by Brandt in 1669. It is prepared from powdered calcined bones by treating them with two-thirds of their weight of sulphuric acid diluted with water, evaporating the liquid portion, and, after mixing with charcoal, desiccating by heating in an iron vessel. The dry mass is then introduced into a stone retort, heated, and the phosphorus evolved collected under water. It is insoluble in water, and is kept in that liquid, but dissolves in native naphtha and bisulphide of carbon; is very inflammable, and sometimes takes fire from the heat of the hand. A remarkable modification exists under the name of amorphous phosphorus, prepared by exposing common phosphorus to 250° for 50 hours. It is not luminous in the dark. Used on a very large scale in the preparation of safety matches. It has been given in small doses in intercostal and trigeminal neuralgia, psoriasis, eczema, and goiter; but even in minute doses it is dangerous. In larger ones it produces jaundice, vomiting, hemorrhage, and death.

PHOTOCHEMISTRY, that branch of science which deals with the chemical changes brought about by the agency of light. The fact that changes in the composition or structure of matter can be brought about by light has been known, probably, since the early part of the eighteenth century, Schultze observing in 1727, that silver chloride, when exposed to sunlight, changed from a creamy white to purplish brown. Generally speaking, the rate of chemical action is proportional to the intensity of the light, but the exact determination of the activity of light was first suggested by John W. Draper, of New York University, who measured the rate of combination brought about by light in a mixture of hydrogen and chlorine. Later, Bunsen and Roscoe made use of a photographic film, measuring the time required to darken the film to a standard tint. The action of light is not confined to any particular wave length, but the most active are the violet and ultra-violet, or so-called actinic, rays. Red light is, for most practical purposes, inactive, and this fact is made use of in

photographic dark rooms in which white light is excluded and red lamps or windows employed. The action of light produces on photographic plates and bromide papers an effect which is not immediately visible, but can be made so by further action of a chemical known as a developer.

PHOTOELECTROTYPE, a block made mainly with the aid of photography and of the electrotyping process, and which can be printed with type like a woodcut. A photographic negative of the subject required is printed on a film of gelatine which has been treated with bichromate of potash, to render it sensitive to the action of light. Those parts on which the light has not acted are soluble in water, and are washed away, leaving the printed parts that are insoluble in relief. From this relief a mold is taken, and an electrotype made in the usual way. Unless special means are taken to translate the half-tones of the photograph into line or stipple, this process is only available for reproducing drawings, etc., in black and white.

PHOTOENGRAVING, a term applied to producing printing blocks or plates by photography. The most commonly employed process is to coat a metal plate with a thin film of asphaltum, and expose it to light under a reversed positive. The picture is next developed by dissolving away the parts of the asphaltum not acted upon by the light, and the plate is subsequently etched in the usual way. This process is sometimes called photo-aquatint. The second method is more elaborate. A film of bichromatized gelatine, on a sheet of glass or a copper plate, is exposed under a photographic negative, and the unprinted portions which are soluble in water washed away, leaving the printed parts in relief. The plate with the relief is next coated with a film of silver by electro-deposition, and placed in an ordinary electrotyping bath, in which it is allowed to remain till a shell of copper from one-sixteenth to one-eighth of an inch thick (according to size of plate) is formed. This, after the rough excrescences have been removed by filing, becomes the printing plate. It can be worked upon by an engraver, if necessary, to remove photographic defects, and is printed on a copper-plate press. When a relief block is required, a reversed negative is used to print from, and the etching is carried to a much greater extent. These processes answer for subjects in black and white, as well as in colors. This is also the system by which conversion of the half-tones of a photograph into an ordinary printing block or plate has become so eminently successful. See PHOTOELECTROTYPE; PHOTOGRAVURE.

PHOTOGRAPHY, the art of producing permanent pictures by means of the chemical action of light on sensitized surfaces. The first to produce permanent pictures by the chemical influence of light was M. Niepce at Chalais-sur-Mer, in 1814, and his idea of the development of a latent image by treatment after exposure lies at the basis of photography. Niepce and Daguerre discovered that they were conducting experiments of a kindred character, and in 1829 entered into partnership. Daguerre, with Niepce's son Isidore, carried on this work in 1839, and invented the process known as the daguerreotype.

The introduction of collodion in 1857 was a great step in photography. The collodion process is divided into five stages: (1) The preparation of a clean glass plate by coating with collodion to which bromide of cadmium and either iodide of potassium or iodide of ammonium has been added. (2) The sensitizing of the collodion by immersion in a bath of nitrate of silver, and distilled water. (3) The production of a latent image by exposing the sensitized plate in the camera. (4) The development of latent into visible image by immersing the plate in a solution of sulphate of iron or pyrogallic acid, to either of which some acetic or citric acid is added. (5) Fixing of the permanent image by immersion of the plate in some solvent of those parts of the sensitive surface upon which the light has acted. This solvent for wet plates is cyanide of potassium, but for more modern processes hyposulphite of sodium is employed. On account of the trouble of preparing the wet collodion plates, the dry plates, made by the gelatine-bromide process, have almost universally taken their place. Dry plates made by some form of this gelatine-bromide process are manufactured on a large scale. When properly made they are much more sensitive than the collodion plates and will keep good for years, and can be developed months after exposure. The positive prints are made by the action of light, passing through the developed plate, on a sensitized paper, over which the plate is placed. The silver, platinum, and ferro-prussiate papers are the most used.

Silver Process.—Suitable paper is coated on one side by a thin layer of albumen, to which chloride of sodium or of ammonium has been added. The old method of dispensing with albumen and using paper which is salted only, is reviving. The paper is sensitized by float-

ing it on a solution of silver nitrate, and drying. After printing, the paper is treated with a solution of chloride of gold, which tones it, producing different shades of color, depending on the length of immersion and strength of solution. After toning, the print is fixed in the same manner as the plate, by a solution of hyposulphite of sodium, which removes the undarkened silver salts. Gelatine or collodion is sometimes used in place of albumen in this silver-printing process. All soluble substances have to be washed from the prints after they have been toned and fixed because otherwise the photographs become ultimately discolored. The papers known as aristotype, argentotype, and celerotype are gelatine emulsions of chloride of silver spread on paper.

Platinum Process.—An image can be obtained in platinum black if the paper is sensitized with ferric-oxalate with which is mixed a solution of chloro-platinite of potassium. The action of light on this paper reduces the ferric salt to the ferrous state, and when the ferrous salt is in solution the platinous salt is reduced by it. By floating the exposed paper on a solution of neutral potassium oxalate, which is a solvent of the ferrous oxalate, the platinum salt in contact with it is immediately reduced to the metallic state, and an image is thus built up. To fix the prints they are immersed in dilute hydrochloric acid, which dissolves away the ferric oxalate, and the oxalate of lime.

Ferroprussiate Process.—The ordinary method of making blue prints.

Composite photography, a method of superposing several or many photographs, thus getting a sort of average of the whole and showing the type. If it is a human composite photograph type, then the eyes of each sitter are brought to the same place on the lens, and the exposure for each is very short.

The most important advance in photography in recent years has been made in the direction of taking photographs in natural colors. Many scientists have worked on the problem and several processes have been developed. The most remarkable of these was perfected in 1907 by Antoine Lumière and his sons August and Louis, of Paris, who succeeded in taking color photographs on a single plate and in an ordinary camera, with exposures of one second and less. Their process consists in the formation of a color screen on a glass plate by placing on it a layer of microscopic grains of transparent potato starch, in three portions colored respectively orange, green, and violet; the plate is then sensitized by coating with a gelatin-bromid emulsion. After the exposure, the plate is developed by a double process that turns it to a positive and the result is a beautiful transparency in the natural colors.

PHOTOGRAVURE, a term applied to methods of producing, by photography, plates for printing in a copper plate press. The processes are kept secret.

PHOTOPHOBIA, a dread or intolerance of light; a symptom more or less present in all inflammations of the eye. It is also met with in many diseases of the nervous system and in many febrile conditions.

PHOTOSPHERE, in astronomy, a luminous envelope believed to completely surround the sun within an outer environment of a dense atmosphere. It is from the photosphere that light and heat are radiated. Used more rarely of the fixed stars.

PHOTOSTAT, a trade name for direct photographing process. By this means copies of drawings, legal papers, records, etc. may be rapidly produced. A special camera, with special developing and fixing attachments, is used in the process. The reproductions are made directly upon the surface of the print paper, which has been coated with a special emulsion. In order that the image will not be reversed the camera is fitted with a reversing prism and a special copying lens. The entire apparatus of the camera and developing plant is self-contained. After exposure the paper passes through the developing and fixing process, and is then cut and dried and is ready for use.

The ordinary photostat print is white upon a black background, but by a slight addition to the process, black prints upon light backgrounds are secured. The process is much used for legal work, duplicating policies, in insurance, and particularly in engineering work, where many copies of the same plans are desired. The scale of the drawing made may be easily altered.

PHOTOTHERAPY, the application of light rays to the treatment of such diseases as tubercular glands, eczema, cancerous growths, lupus epithelioma, and acme vulgaris.

In the decomposition of sunlight or artificial white light, it has been found that different rays have different qualities, some being calorific, or heat-producing, others producing light without heat. Experimentation has proved that there are rays beyond both extremes of the visible spectrum, called ultra rays. The ultra-red rays produce greater heat than

the red ray, which is the extreme visible heat calorific ray.

The violet rays and ultra-violet rays are known to be bactericidal, since culture of bacteria which have been exposed to their action are killed. These rays produce an inflammation (sunburn) and have the power of penetrating the skin.

Dr. Niles R. Fensen, of Copenhagen, Denmark, who introduced this work to the medical profession in 1892, is acknowledged to be the pioneer in the use of light rays for curative purposes. Since it is necessary to use some sort of filtering lens in order that the heat rays do not act upon the part to be treated, Dr. Fensen used an apparatus consisting of double quartz lenses, between which was placed an ammoniacal solution of sulphate of copper. This solution is opaque to the ultro-red, red, orange, and yellow heat rays, but transparent to the blue, violet and ultra-violet light rays.

White light must first be broken up into its component colors, and the heat rays removed by filtering, after which they are focused on the surface to be treated. In spite of the filter, artificial cooling of the surface undergoing treatment is sometimes necessary.

The electric bath cabinet was invented by Kellog in 1894. In this case the patient is placed in a cabinet with his head projecting through an opening in the top, and his body subjected to a baking process, the heat being furnished by various lights inside the cabinet which are controlled by an attendant. This treatment is used for rheumatism, obesity, and for internal congestion.

In responsible hands there is no doubt that much benefit is derived by the practice of these methods, and there are many reputable sanitariums and practitioners of phototherapy, but it has also given rise to many drugless health resorts and other questionable institutions whose object is to prey upon the helpless and infirm.

PHRAGMITES, in botany, reed; a genus of grasses, tribe Arundineaæ. Spikelets panicled, four or six flowered, those above perfect, the lower one with stamens only; all enveloped in silky hairs; palea short, two nerved. Known species five. The hard seeds of *P. arundinacea* and *P. calamagrostis*. In Cashmere the first species is given to cattle, and sandals are made from its stems. In palæontology, a form of reed occurring in the Miocene.

PHRENOLOGY, the science or doctrine which teaches that a relation exists between the several faculties of the human mind and particular portions of the brain, the latter being the organs through which the former act. That the brain, taken as a whole, is the part of the human body through which the mind operates, had been from ancient times the general belief; but the localization of the several faculties was first attempted by Dr. Franz Joseph Gall, who gained, in 1804, a valuable coadjutor in Dr. Spurzheim. When Spurzheim visited Edinburgh, he met Mr. George Combe, who adopted his views, and in 1819 published "Essays on Phrenology," ultimately developed into his "System of Phrenology," which became very popular. Gall enumerated nearly 30, Spurzheim 35, mental faculties which he considered as primitive. These Spurzheim divides into moral, or affective, and intellectual.

PHRYGIA, in ancient geography, an inland province of Asia Minor, bounded N. by Bithynia and Galatia, E. by Cappadocia, S. by Lycia, Pisidia, and Isauria, and W. by Mysia, Lydia, and Caria. It was called Phrygia Pacatiana, and also Phrygia Major, in distinction from Phrygia Minor, which was a small district of Mysia near the Hellespont, occupied by some Phrygians after the Trojan War. The part of Phrygia Major was also called Lycaonia.

PHRYNE (fri-ne), a famous courtesan of Greece, and mistress of Praxiteles, who employed her as a model for his statues of Venus. She acquired immense wealth and offered to rebuild Thebes, provided this inscription should be placed on the walls: "Alexander destroyed this city, and the courtesan Phryne restored it"; but her offer was rejected.

PHTHALIC ANHYDRIDE, $C_6H_4(CO)_2O$. A white, crystalline substance, specific gravity 1.527, melting point 128° C. Sublimes below boiling point. Soluble in alcohol, slightly soluble in ether and hot water. An important intermediate in the dye industry, being used in the manufacture of eosin and other dyestuffs.

PHTHISIS. See CONSUMPTION.

PHYLACTERY, a charm, spell, or amulet worn as a preservative against disease or danger. In Judaism, small square boxes, made either of parchment or black calfskin, in which are inclosed slips of vellum inscribed with passages from the Pentateuch and which are worn to this day on the head and on the left arm by every orthodox Jew on week days during the daily morning prayer. The box of which the phylactery worn on the arm is made consists of one cell wherein

is deposited a parchment strip, with the following four sections written on it in four columns, each column having seven lines:

IV.	III.	II.	I.
Deut. xi: 13-21.	Deut. vi: 4-9.	Exod. xiii: 11-16.	Exod. xiii: 1-10.

These are the passages which are interpreted as enjoining the use of phylacteries. The box of which the phylactery for the head is made consists of four cells in which are deposited four separate slips of parchment, on which are written the same four passages of Scripture. On the outside of this phylactery to the right is impressed the regular three-pronged Hebrew letter *shin*, and on the left side is the same letter consisting of four prongs, which are an abbreviation for the Hebrew word *Shadai*, the Almighty. The phylacteries are generally made an inch and a half square, and have long leather straps attached to them, with which they are fastened to the head and arm. They are worn during prayer and sacred meditation. Also a case in which the early Christians inclosed the relics of their dead.

PHYLLITE, in mineralogy, a mineral found in small shining scales or plates in a clay-slate. Essentially a hydrated silicate of alumina, sesquioxide and protoxide of iron, protoxide of manganese, and potash. Found in Massachusetts and Rhode Island. Also a name given to some slaty rocks of cryptocrystalline to microcrystalline texture, apparently intermediate between mica-schist and ordinary clay slate.

PHYLLOCARIDA, in zoölogy and palæontology; an order of Crustacea, represented by Nebalia and a number of fossil forms. The group is intermediate between the Phyllopoda and shrimps (Decapoda). The body is compressed, with usually a large shield, a pair of stalked eyes; the hind body ending in two or three spines. There are eight pairs of broad, short, leaf-like feet. The fossil forms flourished from the Silurian to the Carboniferous period. The living type is *Nebalia bipes;* it ranges from Maine to Greenland and Norway, and it is only about half an inch long.

PHYLLOPODA, in zoölogy, an order of Crustacea, division Branchiopoda. The feet are never less than eight pairs, and are leafy in appearance. The first pair oar-like, the other branchial, and adapted for swimming. Carapace not always present. They undergo a metamorphosis when young, being called Nauplii. They are of small size, somewhat akin to the ancient Trilobites.

PHYLLOSTOMIDÆ, in zoölogy, the vampires, a family of insectivorous bats. See VAMPIRE BAT.

PHYLLOXERA, in entomology, a genus of insects of the order *Hemiptera*, sub-order *Homoptera*, the type of a family *Phylloxeridæ*, allied to the *Aphis* and *Coccus* families. The *Phylloxeridæ* attach themselves to various plants, on the juice of which they feed, and which they often injure or destroy. *P. vastatrix* is the name given to an insect of this family, which, since 1865, has committed great devastation in the vineyards of France. They produce galls on the roots of the vines which, robbed of nutriment, soon die.

PHYSALIA, in zoölogy, a genus of marine animals of the class Hydrozoa, of the sub-class Siphonophora. The *P. atlantica* is known as Portuguese man of war. They possess one or more large air sacs, by which they float on the surface of the ocean. Numerous tentacles depend from the under side, one class short and the other long. The shorter are the nutritive individuals of the colony, the longer, which in a *Physalia* five or six inches long are capable of being extended to 12 or 18 feet, possess a remarkable stinging power, and are probably used to stun their prey.

PHYSALIS, in botany, a genus of herbs belonging to the *Solanaceæ* or nightshade family. The species most commonly cultivated in the United States is known as strawberry tomato, ground cherry or winter cherry. The berries have a sweetish subacid taste.

PHYSICAL EDUCATION, by physical education or physical training is meant that part of education which deals with the physical activities of mankind. It includes in its scope gymnastics, drill, athletic games and outdoor sports as these are used to develop the sound body. Nowadays we are returning to the Greek conception of physical training; in Greece education in music and in gymnastics was compulsory as the best known training for the body and the will. Among the Romans military training and life in the camp supplied whatever physical education was necessary, for the Romans were essentially a practical people. In the Middle Ages emphasis on the ascetic life prevented any great interest in the perfecting of the body, always excepting the impetus given by chivalry to the need of training for the knight at arms. The Renaissance renewed interest in the body:

and in the humanistic literature of the times there are many allusions to physical education for the gentleman. But the training was still very largely confined to exercise in arms and horsemanship. In the eighteenth century a new conception is added by Rousseau, who in *Emile* (1762) urges the policy of making the child a healthy animal before starting to train his mind. In 1774 modern physical education may be said to have begun when Basedow founded his Philanthropinum at Dessau and introduced daily physical exercises for all students under the direction of a competent instructor. In the second decade of the nineteenth century Friedrich Ludwig Jahn started the popular *Turnverein* movement in Germany, modeling his system on that of the Greeks with the athletic spirit left out. The famous Swedish gymnastics owe much to the Lings, father and son, whose work covers the period from 1814 to 1815. In England in the nineteenth century nearly all the emphasis was laid on sports and games.

"In physical education," as the great authority Dr. Dudley A. Sargent, of Harvard, writes, "America has become the battle ground upon which Old World theories are being fought over again." In the early pioneer days of this country there was little need of attention to physical education; but as the country developed systems were introduced. Thus in the thirties we find the military academies of Captain Alden Partridge in Norwich (Vt.) and Middletown (Conn.) A little later Jahn gymnastics were introduced, and then the Swedish system became popular. Probably in the United States physical education has been more developed than in any other country, although America has originated very little in the way of physical exercises, the Indian game of lacrosse and the game known as "bean bag" of Dr. Dio Lewis being her chief contributions.

In our schools it may be said with truth that physical education is still in its infancy. The American public was aroused to the need of paying more attention to bodily exercise by reason of the large number of men examined and rejected under the draft laws during the war. The system usually followed in our schools was that of German or Swedish gymnastics without, however, either adequate equipment or expert instruction. Of late several States have passed laws providing for compulsory physical education in our schools and a bill is now before Congress "for the promotion of physical education in the United States through co-operation with the States in the payment of supervisors and teachers of physical education." Supporters of this bill (known as the Fess-Capper Bill) assert that careful surveys in all parts of the country prove that at least half the youngsters of America have some kind of physical defect and that all will profit by training in effective, body building physical activities. In our colleges and universities much attention is now being given to physical training, usually though not always to be distinguished from athletics. The pioneer in this work, Dr. Dudley A. Sargent, began at Bowdoin College in 1869 his system of measurements of students which he afterward developed at Harvard University and which has had such influence on gymnastic work in all of our institutions. Through this system he introduced corrective gymnastics which have done so much for the physical improvement of American youth. To-day nearly every American college requires the completion of a certain amount of work in physical training for the degree; and in many institutions the work is graded as in other courses. In progressive colleges the program consists not by any means of gymnastics alone, but also of games and athletic sports.

There is still a lack of properly equipped teachers; but professional training is now being given at such institutions as the Y. M. C. A. College at Springfield, (Mass.) and in many of the universities. Many excellent women teachers are also being trained at Dr. Sargent's school in Cambridge.

Physical education is by no means confined to colleges and schools. The public gymnasium for people of all classes is becoming more and more common; and in public playgrounds also, particularly in the larger cities, there are classes for men and women as well as for boys and girls. In the army and navy much attention is given to setting up exercises and other calisthenic work. Much progress has been made lately in the study of theory not only, but also of practice. There is a society for the Advancement of Physical Education which holds annual meetings and which since 1885 has published annually a volume of proceedings. The American Physical Education Review (1896) is published at Springfield (Mass). Among the colleges the interests of physical education are furthered by the National Intercollegiate Athletic Association and by an association of college teachers of physical training. Physical education occupies an important place in all public health programs both State and National. With the massing of population in the cities

and the substitution of machinery for human labor it is inevitable that more attention must be paid to physical education in the future than in the past; for it is a most direct and vital contribution not only to physical but to intellectual and moral progress.

The study of physical exercises in connection with the anatomy and physiology of the body has shown that exercise has an important place in medicine in the restoration of health and the correction of deformities. The modern use of massage as a means by passive exercise of assisting the circulation and the nutrition of the body is closely connected with the Swedish system of physical education and has been most developed in that country. The Zander system of passive exercise by means of apparatus set in motion by power is also an outgrowth of the Swedish system, and has proved to be of much service.

Physical education has a special place as a part of military training. The object is not the development of muscular strength, but rather agility, endurance and co-ordination. In addition to marching and setting up drills, boxing, fencing, wrestling, skating, swimming and all sorts of outdoor games are useful. Marching is regarded as the most important; it is also the most exhausting owing to the weight of the pack, and good marching is attained only by careful preparation. In the United States physical education has been slow in development and we have adapted the exercises and games developed elsewhere. Lacrosse, which was played by the North American Indians, is the only game originating in the United States. Follen and Lieber, who were pupils of Jahn and expelled from Germany in 1825 in the reaction which followed the war of liberation, came to Boston and first introduced the German methods. This primary movement was short-lived, but the introduction of the Swedish system into Boston by Baron Nils Posen had more permanent results. Through the liberality of Mrs. Hemenway the Boston Normal School of Gymnastics was founded in 1889 to provide for the instruction of teachers of physical education for the schools, and the system was introduced into the public schools of the city in 1890. Eight States, Illinois, New York, New Jersey, Nevada, Rhode Island, California, Maryland and Delaware, have now passed laws making physical education obligatory in all the schools. It has been most developed in the Gary school, where 24 per cent. of the time in the elementary grades is devoted to it, with a proportionately diminished time in the higher grade. There is great difficulty, owing to the great number of students in the public schools and the inadequacy of the teaching force in adapting the system to the needs of the individual child, which should be done if the best results are to be attained. Gymnastic drills of great advantage to the bodily development of a vigorous child would be found too strenuous for a weak, imperfectly developed child of the same age. As far as possible all school exercises should be out of doors and games should play an important part. Under the proper conditions rational systems of physical education, both for children and adults, will lead to a higher degree of physical perfection and an increase in health and happiness.

PHYSICS, a study of the phenomena presented by bodies. It treats of matter, force and motion; gravitation and molecular attraction, liquids, gases, acoustics, heat, light, magnetism, and electricity. It is called also natural or mechanical philosophy. In its broadest acceptance the term physics includes chemistry; specifically it is limited to those phenomena based on the molecule as a unit, whereas the unit of chemistry is the atom.

PHYSIOGNOMY, the art or science of judging a person's nature or character by his outward look, especially by his facial features and characteristics. See LAVATER. Modern writers consult Sims' "Physiognomy Illustrated" (1891); Fosbrook's "Character Reading Through Aspects of the Features" (1914). Also art of foretelling the future fortunes of individuals by the lineaments of the face.

PHYSIOLOGY, the science which treats of the processes which go on in the bodies of living beings under normal conditions, and of the use of their various parts or organs. It is divided into plant physiology, animal physiology, and human physiology. One of the simplest forms of animal life is seen in the amœba of pond water or in the white corpuscle or leucocyte of the blood. These simple organisms are composed each of a single physiological unit, which is termed a cell, that is to say, there are no organs for the carrying on of the various functions of life, but all take place in the same microscopic semi-fluid mass of complex organic nature termed the cell protoplasm. All animals, no matter how complex be their structure, resemble this primitive type, for they consist of an aggregation of microscopic cells. In the leucocyte or amœba all kinds of labor proceed in the same cell which imbibes its own food, prepares

its own nutriment from the food so taken in, is capable of moving from place to place, and in the end is capable of reproducing its like by division. In the higher animal by the evolution of different types of cell, which start from the same parent cell initially but develop afterward along different lines, there come to be formed the various different tissues, glands and organs, each with its own specific function to perform for the general welfare of the whole mass or colony of cells constituting the animal or individual. Thus the skeletal system develops for the support and maintenance of form of the whole, the muscular system to bring about the movements of the animal as a whole and of its various parts with respect to one another; the digestive system for preparing the nutriment for the whole system; the vascular or circulatory system with its contained blood for carrying the nutriment so prepared and distributing it to all the various parts; the respiratory system for taking in oxygen from the air, necessary for the combustion of the foodstuffs and for carrying off the carbon dioxide formed by such combustion in the various tissues; the excretory system for the removal of chemical waste products formed in the tissues; and the nervous system for setting the animal tissues in communication with what is passing both in the body and in the external world.

The source of all the energy of an animal lies in its food, and this is either burned as it were within the tissues, used as fuel for the protoplasmic machinery, or used to keep that machinery in repair; in either case the foodstuffs have to be prepared before they can be used. Such preparation is called digestion, which consists in making the solid foodstuffs soluble. The digested food is absorbed into the blood, and all of it, except the fat, is carried direct to the liver. The liver, among other functions, regulates the composition of the blood, thus it stores the sugar in its cells and gives it out as the other tissues require. Muscular tissue is the great consumer of sugar. An important foodstuff requiring no digestion is oxygen, needed by the protoplasm for its life, and also for the burning of fuel within the living machinery to get heat and energy of motion. The oxygen is held in the BLOOD (*q. v.*) by means of a special substance which greedily absorbs it from the air in the lungs, and yet gives it up readily to the protoplasm of the tissues. The blood as is well known circulates round and round the body pumped by the heart. It is a stream of food material by which each cell of the tissue is fed. For each cell is close to a capillary (a thin blood vessel) along which the fluid food flows and as it flows the fluid part or plasma exudes and bathes the tissues. The plasma which has thus passed out of the blood vessels is collected into another system of vessels, the lymphatics, and eventually emptied into one of the great veins. The lymph stream is also the drain into which is thrown by each cell the waste products of its activity. The carbonic acid that is formed in the tissues is carried away by the blood, and escapes out of the system from the lungs. Some of the useless water is also got rid of in the same way, and some more of it is sweated out by the glands in the skin; the rest is filtered out of the blood by the kidneys. There are many other waste matters besides carbonic acid and water. These are to a large extent prepared for excretion in the liver, and to some extent actually taken out of the blood by that organ, being poured into the intestines, mixed with other matters, dissolved in a fluid called BILE (*q. v.*) They are all taken out of the blood by the kidneys, and cast out of the body along with the water filtered out by the same organs, as urine. For comparative physiology, see the articles on the various functions and groups of animals. Consult works by Loeb, Piersol, Lyle, Cannon, Lamarck, etc.

PIACENZA, a city of northern Italy, on the right bank of the Po, a little below its confluence with the Trebbia, 43 miles S. E. of Milan and 35 N. W. of Parma. Situated at the end of the Via Æmilia and at the last convenient crossing place E. on the Po, it has always been an important city, both strategically and commercially, since its foundation (as Placentia) by the Romans in 219 B. C. It is defended with bastioned walls and an outer ring of forts. The cathedral, in the Lombard-Romanesque style (1122–1233), has an immense crypt, a campanile 223 feet high, and paintings by L. Carracci, Guercino, and others. The church of Sant' Antonio, the original cathedral, was founded in 324. The church of Santa Maria della Campagna is adorned with fine frescoes by Pordenone; and it was for San Sisto that Raphael painted the celebrated Sistine Madonna, sold in 1754 by the monks to Frederick Augustus of Saxony. Among the other buildings are the Palazzo Farnese (1558), once a sumptuous edifice, but since 1800 in use as barracks; the communal palace (1281), and the court house. The principal square is adorned with colossal bronze equestrian statues of Alessandro and Ranuc-

cio Farnese. Manufactures of silks, cottons, pottery, hats, etc., are carried on. The more notable facts in the history of Piacenza have been its capture by the Gauls in 200 and by Totila in 546, the meeting here of two Church councils in 1095 and 1132, its active zeal as a member of the Lombard League in the 12th century, the sacking of it by Francesco Sforza in 1447, and its union with Parma. Pop. about 40,000.

PIANO (Italian), in music, a term meaning soft, or low; used in contradistinction to *forte*. *Pianissimo*, the superlative of *piano*.

PIANOFORTE (Italian *piano*=soft, and *forte* = strong, loud; so-called from its producing both soft and loud effects), a musical instrument, the sounds of which are produced by blows from hammers, acted on by levers called keys. Originally the strings were placed in a small and portable box, and struck by hammers held in the hands. In this early shape, known as the "dulcimer," the instrument can be traced in nearly every part of the globe, and it now survives, almost in its original form, both in Europe and Asia. The dulcimer was also called psaltery, sautrie, or sawtry. The name given to the first instrument with keys acting on hammers was clavicytherium, or keyed cithara, which was introduced in the 15th, or early in the 16th century; next came the clavichord, or clarichord, sometimes called monochord, in which quills plucked the strings; the VIRGINAL (*q. v.*) soon followed; this was succeeded by the spinet, of similar construction but generally triangular in shape; then came the harpsichord, a vast improvement on its predecessors, having a more extended compass and often two manuals. The earliest form of pianoforte, early in the 18th century, was perhaps, in some respects, inferior to a fine harpsichord, but it possessed the elements of expansion, as now exhibited in a modern grand trichord pianoforte of more than seven octaves compass, with every gradation of sound.

PIASSABA, or **PIASSAVA**, a strong vegetable fiber imported from Brazil, and largely used for making brooms. It is chiefly obtained from palms such as *Attalea funifera* and *Leopoldinia piassaba*. The fiber proceeds from the decaying leaves, the petioles of which separate at the base into long, coarse, pendulous fringes. It was first utilized in England, and the consumption is now large. Other European countries also consume considerable quantities.

PIASTER, or **PIASTRE**, a coin of various values. The gold piaster of Turkey = 4.4c.; the silver piaster = 4.35c.; the Egyptian piaster = 4.9c.; the Spanish piaster is synonymous with the United States dollar. The old Italian piaster was equivalent to about 89 cents.

PIATT, JOHN JAMES, an American poet; born in James' Mills, Ind., March 1, 1835. He entered journalism; became clerk of the United States Treasury Department and of the House of Representatives; and from 1882 to 1893 was consul at Cork, Ireland. His works include: "Poems of Two Friends" (1860), with W. D. Howells; "The Nests at Washington" (1864), with Mrs. Piatt; "Poems in Sunshine and Firelight" (1866); "Western Windows" (1869); "Idyls and Lyrics of the Ohio Valley" (1884); "At the Holy Well"; "The Hesperian Tree" (1900). Died 1917.

PIAUHI, or **PIAUHY** (pē-ou-ē), a state of Brazil, bounded by the Atlantic and the states of Ceará, Pernambuco, Bahia, and Maranhao, from which latter it is separated by the Parnahyba; area, 116,490 square miles. Pop. about 500,000. Its coast line is not above 10 miles in length. The soil, generally composed of alluvium, is of great natural fertility; but there is very little agriculture. The rearing of cattle, esteemed the best in Brazil, constitutes the principal source of wealth. Capital, Therezina; port, Parnahyba.

PIAVE RIVER, BATTLES OF THE. The river, one of the largest in Italy, takes its rise in the Venetian Alps, flows southeast, then southwest, emptying into the Gulf of Venice, a few miles west of the city. Its flow is regulated by a number of floodgates, and along its lower portion is too wide to be crossed except by ferry or bridge.

The Piave Valley was the scene of some of the most desperate fighting on the Italian front during the war against Austria-Hungary and Germany; particularly during the year 1917. In October of that year the Italian lines were advanced as far as the Tyrolean, Carnia and Izonzo regions. In the latter part of that month, the Austrians, heavily re-enforced by armies from the Russian front, began a strong offensive against the Italians, beginning along the Izonzo front, von Mackensen being in command of the Teutonic forces. By October 26 the Italians were in rapid retreat, losing territory which had cost them months of effort and hard fighting. Two days later the Italians were driven back on the Tagliamento river. So alarming was the situation that Anglo-French re-enforcements were hurried from France to stiffen the Italian resist

ance. For a week the Italians made a stand on the Tagliamento, but it then became evident that further retreat was inevitable.

Realizing this, the Italians hastily began building a line of defense along the Piave river. By Nov. 7, 1917, the Austro-Germans had crossed the Livenza, but now found themselves facing a solid line of Italians, intrenched along the further bank of the Piave. It was at about this time that General Cadorna, who had been in command of the Italian armies since the beginning of the war, was relieved of his command and replaced with General Diaz.

Reaching the Piave, the Austro-Germans continued their terrific onslaughts, but were held in check by the Italians, along the lower Piave. In the upper Piave Valley, however, Austro-Hungarian troops still continued to press the Italians back, where Asiago was captured, this town being some twenty miles west of the Piave. Along the lower Piave, from Susegana to the mouth of the river, a distance of about forty miles, the Italian troops held firm.

On the upper Piave the Austrians continued to make steady gains, where they succeeded in taking Belluno, on Sept. 10, 1917, together with Vidor and its bridgehead. Here, and during the two days, till September 12, the Austrians claimed to have taken 12,000 prisoners.

On November 12 the Italians recoiled on the Austrians, on the Asiago Plateau, and successfully checked the Austrian advance, along a front reaching from Monte Gallio to Meletta di Gallio. On the lower Piave the Austro-German forces also made a strong attack, but succeeded only in breaking through at one point, about twelve miles from the mouth of the river, and twenty-three miles northeast of Venice. Here the Teutons made a crossing in boats, but were driven back by the Italian counter-attacks.

On Nov. 13, 1917, the Italians suffered several local defeats, losing Primolano, on the upper Brenta, and Feltre, on the middle Piave. At the mouth of the Piave the Teutons again succeeded in crossing and gained a slight foothold on the western bank. This leak the Italians were however able to check and prevent its widening. Further attempts to strengthen this latter gain were made by the Austro-Germans next day, but the Italians seemed now to have recovered their morale to a considerable degree, and the Teuton attacks were severely repulsed. Another attack along the upper Piave was frustrated by the Italians by opening the floodgates.

From now on the Italians held their ground, and now ensued one of those extensive battles, lasting four weeks or more, which were so peculiarly a feature of the great war. Day by day the line of battle blazed continuously, one side gaining here, losing there, but the general result being a deadlock. Again and again the Teutons attacked, were repulsed, and then were called upon to resist stubborn counter-attacks by the Italians. Day by day positions changed hands frequently, but there was no longer any continuous forward movement on the part of the Teutonic offensive.

Toward the end of December the French and English contingents began to participate in the fighting. On December 16 the English launched a furious assault against the Austrian positions on Monte Fontana Secca, but were driven back by the enemy machine gun fire. On December 30 both the French and English delivered a series of assaults which gained them some important positions on Monte Tomba. Here the Teutons suffered some further losses during the middle part of January. During the latter part of the month the Italians made some positive gains, succeeding in pushing the enemy back from the Piave, up as far as Asiago. Down along the lower Piave the fighting during January, 1918, became again furious, and the Teutons made some temporary gains, succeeding in crossing the river at several points. But nowhere were these successes extended; everywhere they shrivelled up before the determined Italian counter-attacks. It now became obvious that Venice and the Italian plains would be safely held against the Austro-German offensive, which by this time showed plainly that it had passed its maximum strength. The Italian command had no doubt been taken by surprise at the beginning of the offensive, and, being unprepared for so terrific an onslaught, had had to give way over considerable territory. But what the Teutons had gained in mere territory, they had more than lost in the tremendous expense of man power. It was one of those mighty efforts which distinguished the German method of warfare, but in its final purpose it was a complete failure. Not a little did it, and the Italian defense, contribute to the eventual defeat of the German forces which culminated in the armistice in the fall of 1918.

PIAZZA, a square open space surrounded by buildings or colonnades; popularly, but improperly, applied to an arcaded or colonnaded walk under cover, and even to a veranda.

PIAZZA ARMERINA, a town of Sicily, in the province of Caltanissetta. It contains the estates of many nobles and land-holders. It has a cathedral, an old castle, and several schools. It has an extensive trade in corn, oil, fruits, and wine. Pop. about 35,000.

PIBROCH (pe-brok), a series of variations or a sort of fantasia, played on a bagpipe, descriptive of some scene or of a poetical thought. In Scotland a martial air on the bagpipes. It can only be learned by personal instruction, as the scale of the bagpipe contains sounds unrepresented by any notation. Pibroch is sometimes used figuratively for the bagpipe itself.

PICARDY, an ancient province in the N. of France, bounded on the W. by the English Channel, and on the E. by Champagne. The territory now forms the department of Somme, and portions of the departments of Aisne and Pas-de-Calais. It was the scene of intense fighting during the World War (1914–1918) notably in the Battle of the Somme. Here the Germans on March 21, 1918, began the first of the great drives that ended in disaster.

PICARDY, BATTLES OF, a series of bloody battles constituting the great German offensive against the Allied lines on the western front, beginning early in March, 1918, centering toward Amiens, in Picardy, officially known as the Department of the Somme. It constituted one of the chief efforts of the Germans to break through the Allied front and gain a decisive victory and was perhaps the most critical moment of the war.

Beginning in the first week of March, 1918, the German forces began a number of local attacks and raids in force, obviously with the purpose of feeling out the weakest point in the Allied lines. Here, and at this time, the American troops first took part in the fighting to any significant extent.

On March 21 the Germans launched their great offensive, over a front fifty miles in width, extending from the river Oise, in the neighborhood of La Fère, to the Sensée river, near Croisilles. The British, under General Sir Hubert Gough, held the front from the Oise to a point north of the Omignon river, where another British army, under General Sir Julian Byng, continued the line on to the Scarpe river, joining here a third British force under General Sir Henry Thorne. Facing the three British armies was an equal number of German armies.

Here was the main point of attack, the great aim being to drive a wide salient through the Allied lines and separate the French from the British. The German objective was Amiens, which was then the most important strategical point in northern France.

About fifty German divisions entered into the first attack. Among the points against which the Germans first directed their efforts were Bullecourt, and Noreuil, west of Cambrai, the St. Quentin Ridge, on the right of the Cambrai salient, and Rossoy and Hargicourt, south of Cambrai.

In the afternoon of March 22, 1918, and later in the evening, the British began to give way before the tremendous German pressure, and next day were forced to retire along the whole front across the Somme, pursued closely by the Germans.

This was probably the most critical moment of the campaign. The British and the French had been thrown out of touch with each other, and unless the gap could be filled, the Germans would have accomplished their main immediate object.

It was then that General Carney, with General Byng's army on the north, one division of mixed units, got in touch over the eight mile gap, and the French General Fayolle saved the situation in the south over a thirty mile gap between the British and the French. Meanwhile, however, the Germans were announcing a decisive victory at home, and that the Kaiser was in personal command of the operations.

Nevertheless, the temporarily demoralized British forces held their positions along the Somme, and during the next few days the Germans were unable to make any further advance, though their tremendous attacks in mass continued.

On March 26, 1918, the Germans began an attack on the Allied lines south of the Somme and succeeded in capturing Roye. West of this point and Noyon the British, American and French troops held the Germans back. About 840,000 of the latter were pressing the attack. The German losses were tremendous; much heavier than were those of the Allies, who were in defensive positions.

By the end of the first week, however, the Germans had won back most of the line they had lost when retreating from the Somme in 1916, on the fifty mile front from the Oise to the Scarpe. The offensive had not achieved the high degree of success that the Germans had expected, but the Allies had nevertheless suffered a defeat of considerable magnitude. They had lost considerable territory, but, on the other hand, they had lost over half a million men, whereas the

British, who had borne the brunt of the attack, had lost not much over 100,000. Furthermore, it was now evident that the Germans had spent themselves considerably, and were forced to slacken their efforts, to gain breath. It was at this time, March 28, 1918, that the announcement was made that General Foch had been made commander-in-chief of all the forces on the western front.

In the last two days of the month the Germans again renewed their efforts, with the added weight of heavy re-enforcements of troops that had been brought from the eastern front. Six villages around Montdidier were taken from the French, though two of these were retaken the following day. Between Montdidier and Moreuil the Germans delivered especially heavy attacks. Moreuil changed hands several times during the two days. Between Moreuil and Lassigny the Germans were successfully checked. On the British front the Germans were equally active. But here they gained no ground and only lost heavily in casualties. South of the Somme the British regained possession of the village of Demuin.

At the end of this two-days' effort it was obvious that the German offensive was more than ever a failure. The critical moment had passed.

Early in the morning of April 4, 1918, the Germans launched a new offensive, headed directly toward Amiens, from three directions. Fifteen German divisions were directed toward the French, and fourteen against the British; altogether about 350,000 men, on a sixteen mile front. Ten desperate assaults were delivered against the French, during the day and the succeeding night, but although the Germans gained some ground, the French could not be dislodged from their main positions on the higher ground, in the neighborhood of the village of Morisel. Grivesnes was subjected to exceptionally heavy pressure, but the French were able to sustain their hold at this point. So battered were the Germans by these efforts that on the following day the French, under General Pétain, succeeded in making some considerable gain of territory through their counter-attacks, in the region south of Moreuil. The northern and western outskirts of Cantigny, which had been captured a few days previously by the Germans, were also again in the hands of the French.

Meanwhile the British south of the Somme were also subjected to a severe pressure. The British fought stubbornly, but were forced back to within nine miles of Amiens. But the net result of this two-days' spurt of activity by the Germans was a slight gain purchased at a price in men lost decidedly too heavy. Now there came another of those characteristic lulls, following these great efforts, which were probably periods during which activity was merely transferred to behind the German lines, in the bringing up of new men and war material.

The lull was short. On the morning of April 10, 1918, the Germans broke loose again, directing their fierce attacks against the British positions between the Lys river and Armentières. Here the British were driven back to the line running through Wytschaete, along the Messines Ridge, to Ploegsteert. Farther south the Germans crossed the Lys. Still farther south the British held their positions. Givenchy was recaptured from the Germans, important in that it was on high ground and commanded the road to Bethune. It was now obvious that the Germans had given up their original plan of driving a wedge in between the British and the French, and that now, instead, they hoped to exhaust the British by sheer weight of superior numbers.

During the next week the British were called on to test their utmost endurance. Again and again the Germans brought up new contingents and hurled them prodigally at the British lines. On April 15, 1918, the British were driven out of Bailleul. Other notable gains were made by the Germans on this day. Wytschaete was taken and Haig's men were driven from most of their positions along the Messines Ridge.

At the end of the week, however; on April 20, 1918, it began to become quite obvious that the Germans had fought themselves to a standstill; that it could now be said that the main offensive was a failure, and that the Allies could now look into the future with confidence. During this last phase of the offensive the Germans had all but exhausted themselves in the Lys region, and though at times the British had been strained to the point of breaking, they had succeeded in holding back the Teuton onslaught. The net result to the Germans had been a considerable gain of territory, encouraging to the layman behind the lines, but of slight value from a military point of view, in that the price for this territory had been too heavy in men.

Fighting in this region continued with considerable fury for some weeks, but the big battles of Picardy had been fought, and lost by the Germans.

PICASSO, PABLO, a Spanish painter and sculptor. He was born at Malaga

in 1881, and early developed a post-impressionist style which came to be called Cubism, of which he is held to be the originator. Light and shadow became the chief elements in his work which aimed at psychical suggestion over the distinct physical representation. His aim is the depth and perspective that lie beneath the superficies to which painting is apparently confined. His work in painting and sculpture attracted the chief attention at the International Exhibition of Modern Art in New York in 1913.

PICAYUNE, the name of a Spanish half real in Florida, Louisiana, etc.

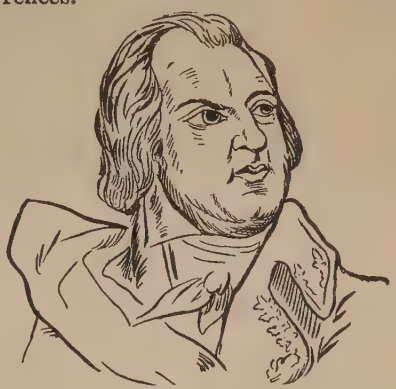
PICCOLO, a small flute, having the same compass as the ordinary orchestral flute, but its sounds are one octave higher than the notes as they are written; called also an octave flute. Also, an organ stop of two feet length, the pipes are of wood, the tone bright and piercing. Also, a small upright piano, about three feet and a half high; used for certain brilliant effects.

OCTAVIO PICCOLOMINI

PICCOLOMINI, a distinguished Siennese family, still flourishing in Italy in two branches. The two most celebrated members are: (1) ÆNEAS SYLVIUS BARTHOLOMÆUS, afterward Pope Pius II. (2) OCTAVIO, a grand-nephew of the first; born in 1599, died in Vienna in 1656. He served in the armies of the German emperor, and became one of the distinguished generals in the Thirty Years' War. He was a favorite of Wallenstein, who intrusted him with a knowledge of his projects, when he purposed to attack the emperor. In spite of this he made himself the chief instrument of Wallenstein's overthrow, and after the latter's assassination (1634) was rewarded with a portion of his estates.

PICCO PIPE, a small pipe, having two ventages above and one below. It is blown by means of a mouth-piece like a *flûte à bec* or whistle; and in playing, the little finger is used for varying the pitch by being inserted in the end. The player, Picco, after whom it was named, produced a compass of three octaves from this primitive instrument.

PIC DU MIDI, a summit of the Pyrenees, 9,466 feet high, in the S. E. corner of the French department of Basses-Pyrénées.



CHARLES PICHEGRU

PICHEGRU, CHARLES (peezh'groo), a French military officer; born in Arbois, France, Feb. 16, 1761, of humble parents, but receiving a good education under the monks of his native town. Entering the army he soon rose to the rank of general and in 1794 succeeded General Hoche in the command of the Army of the North. He shortly after relieved Landau, and compelled the English to evacuate the Netherlands. He next marched into Holland, of which he made a complete conquest, and, in 1797, was elected a member of the Legislative body; but his opposition to the Directory, and his speeches in favor of the royalist emigrants, occasioned an accusation against him as designing to restore royalty. Without trial he was transported to Cayenne, whence he escaped to England. In 1804 he returned to Paris, was again apprehended and sent to the Temple, where he was found strangled in his bed, April 5, 1804.

PICHINCHA, "boiling mountain," the most populous province of Ecuador, em-

braces the Quito plateau and its slopes; area 9,030 square miles. The soil is fertile in the W. The province takes its name from the active volcano of Pichincha, 8 miles N. W. of Quito, the chief town. It has five peaks, two of which (15,418 feet) Mr. Whymper ascended in 1880. The enormous crater, nearly a mile across at the top and perhaps 1,500 feet in diameter at the bottom (which is 2,500 feet below), is said to be the deepest in the world. Pop. about 205,000.

PICHON, STÉPHEN, a French journalist and statesman, born in Arnay le Duc, 1857, studied medicine at the University of Paris, but instead of following the medical profession, he took up journalism and, in 1880, joined the editorial staff of "La Justice." In 1882 he was elected to the municipal council of Paris, of which he later became secretary. In 1885 he was elected to the Chamber of Deputies, of which he was secretary from 1889 to 1890. In 1894 he served successively, for short periods, as French Minister to Hayti, Brazil, China (where he was present during the Boxer uprising) and to Tunis. In 1905 he became a member of the Senate, from Jura. In the year following he was given the portfolio for Foreign Affairs, by Clemenceau. This same post he held in the Briand Cabinet, in 1910-1911 and under Barthou, in 1913. After the reorganization of the French Cabinet, in November, 1917, when Clemenceau became Premier, Pichon again became Minister of Foreign Affairs, and also a member of the War Committee of the Cabinet. At the Peace Conference at Versailles he acted as one of the French delegates.

PICHURIM BEANS, a name given to the seed lobes of *Ocotea pichurim,* a South American tree. They resemble nutmeg and sassafras in taste and are used for flavoring chocolate, etc.

PICIDÆ, woodpeckers; a family of zygodactyle Picarian birds, with, according to Wallace, 30 genera and 320 species, almost universally distributed, being only absent from the Australian region beyond Celebes and Flores. Bill more or less straight; toes in pairs. They are insectivorous; the tongue is extensile, barbed at the point, and covered with a viscid solution to assist them in catching their prey; tail feathers hard and stiff, terminating in points, enabling the bird to run up the trunks of trees with facility.

PICKENS, ANDREW, an American military officer; born in Paxton, Pa., Sept. 13, 1739, of Huguenot ancestry. In 1752 he removed to South Carolina; was engaged in the expedition against the Cherokees in 1761. During the Revolution he was promoted Brigadier-General; took part in the defense of South Carolina against the British. He defeated the Tories at Kettle Creek, and in the battle of the Cowpens, commanded the militia, rallying them when retreating; received a sword from Congress for gallant conduct. He served in Congress from 1793 to 1795; and made treaties with the Indians. He died in Tomassee, S. C., Aug. 17, 1817.

PICKENS, FORT, a fort on Santa Rosa Island, Pensacola harbor, held by a small Union force under Lieut. A. J. Slemmer at the beginning of the Civil War. It refused to surrender when besieged by the Confederates in 1861, and was held till re-enforced.

PICKEREL

PICKEREL, a small pike, a young pike. The term is applied to several species of fishes belonging to the pike family.

PICKEREL WEED, a genus of fresh water plants, the *Pontederia.*

PICKERING, TIMOTHY, an American statesman; born in Salem, Mass., July 17, 1745; was graduated at Harvard in 1763, and admitted to the bar in 1768. He participated in the battle of Lexington; in 1776 joined the Continental army in command of 700 men; was soon appointed adjutant-general by Washington; in 1780 was selected for the post of quartermaster of the army. Shortly after his resignation, he united with Patrick Henry and Alexander Hamilton in opposing the measure that drove the Tories from the country. He negotiated a treaty between the United States and the Six Nations in 1791, and a month later was appointed Postmaster-General. He was Secretary of State under Presidents Washington and Adams, but was dismissed during the "X. Y. Z." papers dispute in 1800. He retired from politics for a time, but was elected to the United States Senate in 1804, and from that time continued actively in politics. He died in Salem, Jan. 29, 1829.

PICKERING, WILLIAM HENRY, an American astronomer; born in Boston, Mass., Feb. 15, 1858; was graduated

at the Massachusetts Institute of Technology in 1879; became assistant professor at the Harvard Observatory; and conducted several expeditions to observe the total solar eclipses in different parts of the Western Hemisphere in 1878–1893. He established astronomical stations in Southern California in 1889; at Arequipa, Peru, in 1891; and at Mandeville, Jamaica, W. I., in 1900. He had a record as a mountain-climber, having ascended over 100 peaks. Among his astronomical works is "Visual Observations of the Moon and Planets."

PICKETT, GEORGE EDWARD, an American military officer; born in Richmond, Va., Jan. 25, 1825; was graduated at the United States Military Academy in 1846; served in the Mexican War as lieutenant and was made captain in 1855. In 1861 he left the United States service and entered the Confederate army. He was commissioned Brigadier-General and was distinguished throughout the war for bravery and activity. In 1862 he was made Major-General. He took a prominent part in the battles of Fredericksburg, Gettysburg (where his division made the famous "Pickett's charge"), Petersburg, and Five Forks. He died in Norfolk, Va., July 30, 1875.

PICKFORD, MARY (MRS. DOUGLAS FAIRBANKS), an American actress, born in Toronto in 1893. Her family name was Smith. After some success on the stage she went into moving pictures where she has been a great success. She married Owen Moore, also a moving picture actor, from whom she obtained a divorce in 1920. She then married Douglas Fairbanks.

PICO, one of the Azore Islands, consisting of a single volcanic mountain, which terminates in a peak (El Pico) 7,613 feet high that emits smoke and lava. It is fertile and well wooded, and produces an excellent wine, of which 25,000 pipes are exported annually. Area, 175 square miles; pop about 30,000. Chief town, Villa di Lajuna; pop. about 1,500.

PICRATE, or **CARBAZOTATE**, a compound of picric or carbazotic acid with a base.

Explosive powders, almost entirely composed of picrate of potash, and nitrate of potash, were used in the Franco-Prussian War of 1870 with the most appalling effect.

Derivatives of picrate were used for explosives in vast quantities during the World War (1914-1918).

PICRIC ACID, Trinitrophenol, $C_6H_2(NO_2)_3OH$., a yellow crystalline solid, melting point 122° C, soluble in water and alcohol, very soluble in ether. The aqueous solution stains the skin yellow. Obtained by the action of nitric acid on phenol, or by the nitration of monochlorbenzol in the presence of sulphuric acid. Very poisonous and explosive. Used in the manufacture of explosives, for dyeing silk and in the tanning industry. Also in the laboratory in urine analysis, and as a reagent for detecting alkaloids. In medicine, it is used externally in the treatment of burns and acute eczema, and internally for treating malaria and as a bitter tonic. (See LYDDITE.)

PICRITE, a rock, consisting principally of olivine and augite, with occasionally hornblende, felspar, and magnetite. First found at Teschen, Silesia.

PICROTOXIN, in chemistry, $C_{12}H_{14}O_6$, the poisonous principle of *Cocculus indicus* and extracted from that berry by means of hot alcohol.

PICTON, SIR THOMAS, a British military officer; born in Poyston, Pembrokeshire, England, in August, 1758. He entered the army in 1772. In 1794 he went out to the West Indies; took part in the conquest of several of the islands, including Trinidad, and was appointed (1797) governor of the last named, being shortly afterward promoted general. In 1803 he was superseded, and made governor of Tobago. He saw active service again, in 1809, and was made governor of Flushing after its capture by the English; he was summoned to Spain, and rendered brilliant service at Busaco, during the subsequent expulsion of the French from Portugal, at Fuentes de Onoro, at the sieges of Ciudad Rodrigo and Badajoz, at Vittoria and in the battles of the Pyrenees, at Orthez and before Toulouse. Napoleon's escape from Elba once more called Picton into the field; he fought at Quatre Bras, and at Waterloo fell leading his men to the charge, June 18, 1815.

PICTOU, a port of entry on the N. coast of Nova Scotia, on a large and sheltered harbor, 85 miles N. N. E. of Halifax. The town contains mills and factories, and coal, mined in the vicinity, is exported.

PICTS, the name by which, for five and a half centuries (A. D. 296–844), the people that inhabited Eastern Scotland from the Forth to the Pentland Firth, were known. In the Irish chronicles they are generally styled Picti, Pictones, Pictores, or Piccardaig, but sometimes the native Gaelic name of Cruthnig is applied to them, and their country is

called Cruithen-tuath, the equivalent of Latin Pictavia and Old Norse Pettland, which still survives in the name of the Pentland Firth. There were Cruithni or Cruthnig also in Ireland—never, however, called Picti.

The Picts are first mentioned in connection with the campaigns of Constantius Chlorus in Britain, in 296 and 306. Caledonia is the name given by Tacitus to Scotland N. of the Firths of Forth and Clyde, and he describes the Caledonians as a noble race of barbarians, who fight in chariots as well as on foot, with long swords and short shields, and whose fair red hair and large limbs argued a German origin. Ptolemy (120) places 14 tribes in Tacitus' Caledonia, inclusive of the Caledonians themselves, and the more E. ten of these may be claimed as Picts. So troublesome were these Northern tribes to the Roman province that in 208 the Emperor Severus came to Britain and vainly attempted their subjugation. The contemporary historians mention only two tribes N. of the Forth and Clyde wall—the Mæatæ and the Caledonii—and Tacitus's noble barbarians appear in their pages but squalid savages. Yet they had chariots and weapons as described by Tacitus, with daggers and peculiarly knobbed spears. One hundred years later the Caledonians and other Picts, as already said, were encountered by Constantius, and still 50 years later they harassed the Roman province (360) now in company with the Scots, who are first mentioned at this date, and who appeared as great seawanderers. The Picts and Scots were helped in this "continual vexing" of the Britons by the Saxons and Atecotti. Theodosius the elder in 369 subdued these Northern foes and restored the district between the walls to Roman Britain, and the usurper Maximus signalized his assumption of power in 383 by an energetic campaign against the Picts and Scots. During the next quarter of a century the Romans were losing their hold on Britain, and their Northern foes pressed on the province with great persistence.

The Southern Picts were converted to Christianity by St. Ninian (about 400), and the Northern Picts over a century and a half later by St. Columba.

The year 839 saw a great defeat and slaughter of the Picts by the Danes, with confusion once again, from which emerged in 844 Kenneth MacAlpin, the Scot, as king over both nations, henceforward not to be disunited. Many things contributed to the overthrow of the Pictish kingdom; the disunion, physical and otherwise, between Northern and Southern Picts; the rule of female succession which allowed Anglic, Briton, and Scottic princes to rule in right of their mothers, and the superior culture of the Scots, Christian and literary. We really do not know much about the isles and W. coast N. of Argyll, nor indeed of the counties N. of Inverness, from the time of Brude MacMailchon till the Norsemen came. It is quite certain that the Scots colonized these very early, and had, indeed, established themselves in Perthshire. Aidan, the son of Gubhran, made expeditions to Orkney, and fought the Picts and defeated them on the Forth, or even farther E., in Mearns.

The Picts, whatever traces they show of a non-Aryan racial element, with its consequent survival of lower ideas of marriage laws, spoke a Celtic language belonging to a branch of Celtic allied to the Cymric, but dialectically different from the Welsh of Bede's time; and that this dialect of the Galo-Cymric stock was a wave of Celtic speech from the Continent previous to the Gaulish which held England when Cæsar entered Britain.

PICUL, a Chinese weight of 133⅓ pounds. It is divided into 100 catties, or 1,600 taels; also called tan.

PIEDMONT, or **PIEMONT**, a former Italian principality, which now forms the N. W. part of the kingdom of Italy; is by the Alps separated from Switzerland on the N. and from France on the W.; on the E. lies Lombardy, and on the S. Liguria and Genoa. It included the duchy of Monferrat and part of the old duchy of Milan, and now embraces the provinces of Alessandria, Cuneo, Novara, and Turin, and covers 11,331 square miles, with a pop. about 3,200,000. From the end of the 12th century the name Piedmont was used as a collective title for the territories ruled over by the House of Savoy on the E. side of the Graian and Cottian Alps.

PIER, a detached pillar or wall supporting the ends of adjoining trusses or spans, or the springers of adjacent arches. Also an upright projecting portion of wall, similar to a pilaster, throwing the intervening sunken portions into panel. Also a buttress. Also a mole or jetty extending out from the land into the water, adapted to form a landing place for passengers or merchandise from ships which float in the deep water alongside the pier or wharf.

PIERCE, FRANKLIN, an American statesman, 14th President of the United States; born in Hillsboro, N. H., Nov. 23, 1804. He was educated in the

schools of his native State and at Bowdoin College, where he studied in company with Longfellow, Hawthorne, and Prentiss, graduating in 1824. He was admitted to the bar in 1827, and in 1829 was elected to the New Hampshire Legislature. In 1833 he entered Congress, serving four years, and in 1837 was elected to the United States Senate, being the youngest member of that body, which contained such men as Webster, Clay, Calhoun, Benton, Buchanan, and Silas Wright. In 1842 he resigned from the Senate and retired to private life. He engaged in public debate with John P. Hale on the slavery question, Pierce advocating the constitutional right of that institution. In 1846 he enlisted for the Mexican War, was appointed brigadier and fought in the battles of Contreras and Churubusco. After the war he continued the practice of law, frequently advocating the political principles of the Democratic party in public, and favoring the compromise measures of 1850, including the Fugitive Slave Law. In 1852 he was nominated for the presidency on the 49th ballot, by the Democratic National Convention, and was elected by an electoral majority over General Scott of 254 to 42. During his administration the Missouri Compromise was repealed, a reciprocity treaty for trade with the British American colonies was made; a treaty with Japan was established; and the Mexican boundary disputes settled. After his term expired, he traveled abroad and, returning, lived thereafter in retirement at Concord, where he died, Oct. 8, 1869.

PIERPONT, JOHN, an American poet; born in Litchfield, Conn., April 6, 1785. He became a Unitarian clergyman and served as chaplain in the Civil War. Among his works is "Airs of Palestine, and Other Poems" (1840). One of his best known poems is "Warren's Address at the Battle of Bunker Hill." He died in Medford, Mass., Aug. 27, 1866.

PIERRE, a city of South Dakota, the capital of the State and the county-seat of Hughes co. It is on the Missouri river and on the Chicago and Northwestern railroad. The city has a State library, a government school for Indians, the State capitol, library, a handsome Federal Building, hospitals and schools. It is an extensive stock raising and farming community. The city is supplied with natural gas.

PIERREPONT, EDWARDS, an American diplomatist; born in North Haven, Conn., March 4, 1817; was graduated at Yale in 1837, and at its Law School in 1840; became a member of the Ohio bar. He was elected a judge of the Superior Court of New York in 1857; was appointed a colleague of Gen. John A. Dix to try the prisoners of war confined in various prisons and forts of the country in 1862. He was one of the counsel for John H. Surrat, indicted for complicity in the murder of President Lincoln; in 1875 became attorney-general of the United States in Grant's administration; and in the following year was appointed United States minister to Great Britain. He tried many famous cases during his professional career, and was noted as an orator. He died in New York City, March 6, 1892.

PIERROT, a comic character on the French stage, dressed like the harlequin, and playing the part of a cunning but cowardly rogue. Also the modern pierrot of the stage who whitens his face, wears a while loose suit with large black plush buttons down the front of the coat, and a black skull cap. He is often the hero of poetic or pastoral love dramas.

PIETÀ, in painting and sculpture, a representation of the Virgin, embracing the dead Christ. In St. Peter's at Rome is a Pietà by Michael Angelo.

PIETERMARITZBURG, or **MARITZBURG**, capital of the province of NATAL (*q. v.*). It occupies a fine situation near the Umgeni river, 54 miles N. of Durban. It is the seat of government, headquarters of the military, and its municipal affairs are managed by a mayor and town council. It takes its name from its founders, the Boer leaders Pieter Retief and Gert Maritz. There is railway connection with Durban, and also to the borders of the Orange River Colony and the Transvaal. Pop. about 35,000.

PIETIST, a member of a party of reformers in the Lutheran Church in the 17th century. The leader of the movement, an Alsatian, Philip Jacob Spener (1635–1705), when pastor in Frankfort, in 1670, was in the habit of holding private gatherings in which the Scriptures were explained practically rather than dogmatically, and, this movement spreading, Spener published a work, "Three Desirable Things of Religion," in which he deplored the incessant preaching of dogma, and formulated the opinion that a virtuous life was of more importance than a correct creed. After Spener's death the executive interfered, and proscribed the open profession of Pietism, so that its professors had no opportunity of forming a new sect.

PIETRA DURA, a species of inlaid work composed of hard stones, such as agate, jasper, chalcedony, carnelian, and lapislazuli, set in a slab of marble, generally black.

PIGEON. See CARRIER PIGEON.

PIGEON PEA, the fruit of the leguminous shrub *Cajanus indicus*, a native of India, but now cultivated in tropical Africa and America. In India the pigeon pea forms a pulse of general use; called also Angola pea and Kongo pea.

PIG IRON. See IRON AND STEEL.

PIGMENT CELL, a small cell containing coloring matter, as in the choroid coat of the eye.

PIKE, a military weapon, consisting of a narrow, elongated lance-head fixed to a pole or a simple spike of metal. The end of the staff had also a spike for insertion in the ground, thus allowing a musketeer to keep off the approach of cavalry while attending to his other arms. It is now superseded by the bayonet. Also, any individual of the genus *Esox*, especially *Esox lucius*, the common pike. It is one of the larger fresh-water fishes, sometimes attaining a length of five or six feet, and much esteemed for food. Pikes are extremely voracious, and small fish and frogs form their staple food. They commence to spawn at three years old; the ova are deposited in March, and the spawning season lasts about three months. The pike are migrants, and have been known to travel overland. The head and back are olive-brown, sides paler, belly silvery white; body mottled with roundish spots, which sometimes form cross bars on tail. The English name has reference to the elongated form of the fish, or the shape of its snout.

PIKE, ZEBULON MONTGOMERY, an American military officer; born in Lamberton, N. J., Jan. 5, 1779; was appointed an ensign in his father's regiment in 1799; conducted an expedition sent by the government to trace the Mississippi to its source in 1805; also made explorations in Louisiana Territory, discovering Pike's Peak and reaching the Rio Grande in the course of his travels. In 1813 he was promoted Brigadier-General, and on April 13 of that year while in command of the attack on York (now Toronto), in Upper Canada, was killed.

PIKE PERCH, *Lucioperca*, a genus of fishes closely allied to the perch, but showing a resemblance to the pike in its elongated body and head. Like the pike, it is a dangerous enemy to other fresh-water fishes, but the flavor of its flesh is excellent. In Europe it occurs in two species. It also occurs in the fresh

PIKE PERCH

waters of North America, such as the Great Lakes, the Upper Mississippi, and the Ohio.

PIKE'S PEAK, a peak of the Rocky Mountains, in Colorado, 65 miles S. of Denver, discovered by Captain Pike, U. S. A., in 1806. It is situated in lat. 38° 50′ N., and lon. 105° 2′ W., and rises to a height of 14,147 feet. On its summit is one of the highest meteorological stations in the world.

PILASTER, a square column, generally attached to a wall, as an ornamental support to an arch, etc., and seldom projecting more than one-fourth or one-third of its breadth from the wall.

PILATE, PONTIUS, a Roman ruler, who became governor of Judæa, A. D. 26. He commanded in that country 10 years. The Jews brought Jesus Christ before Pilate, who, perceiving that envy and malice occasioned their charges, would have scourged the prisoner and dismissed him, but being threatened with the wrath of Cæsar, Pilate delivered Jesus, whom he pronounced innocent, to be crucified. He is said to have subsequently treated the Samaritans with great cruelty, for which he was recalled by Tiberius, and banished to Gaul, where he slew himself, A. D. 37 or 38.

PILATUS, MOUNT, an isolated mountain at the W. end of the Lake of Lucerne, rising opposite the Rigi. The lower half is clothed with wood and meadow, the upper portion is a mass of bare and jagged peaks, rising in the Tomlishorn to 6,998 feet. Below the summit lies Lake Pilatus. Since 1889 there has been a tooth-and-rack railway from Alpnach to the top, whence there is a splendid view of the Bernese Alps. In 1891 a steel tower was undertaken, to be 300 feet in diameter at its base and 840 feet high, and so pierce any enveloping cloud.

PILCHARD, *Clupea pilchardus*, an important food fish, found on the coast of Northwestern Europe. It abounds also on the coast of Portugal and in the

Mediterranean. It is a thicker and smaller fish than the herring; the upper part of the body is bluish-green, belly and sides silvery-white.

PILCOMAYO, a river in South America, which rises in Bolivia, on the E. declivities of the Andes, and falls into the Paraguay, near Asuncion, after forming the boundary between Paraguay and the Argentine Republic. Its entire length is between 1,500 and 1,600 miles.

PILE, a beam or timber driven into treacherous ground to form a foundation for a structure, or to form part of a wall, as of a cofferdam or quay. In heraldry, one of the lesser ordinaries, triangular in form and issuing from the chief with the point downward. When borne plain it should contain one-third of the chief in breadth, and if charged two-thirds.

PILGRIMAGE, a journey undertaken by a pilgrim; specifically, a journey to some distant place, sacred and venerable for some reason, undertaken for devotional purposes. Pilgrimages are an essential part of the Hindu and Mohammedan systems, and the visits to Jerusalem three times a year of the Jewish race were of the nature of pilgrimages. The Empress Helena led the way in Christian pilgrimages by visiting Jerusalem in A. D. 326.

PILGRIM FATHERS, the name given to 102 Puritans, who sailed in the "Mayflower," from Plymouth, on Sept. 6, 1620, to seek in America the religious liberty denied them in England. Landing on Plymouth Rock, they, on Dec. 25, 1620, founded a colony, which became the germ of the New England States.

PILLAR OF HERCULES, THE, Calpé (now Gibraltar rock), and Abyla, opposite to it in Africa, which Greek story says were torn asunder and separated by Hercules about 1220 B. C. The Mediterranean was previously, like the Caspian, without connection with the ocean, hence the name *Mediterraneum Mare* (Inland Sea).

PILLORY, formerly a common instrument of punishment for persons convicted of forestalling, use of unjust weights, perjury, forgery, libel, etc. It consisted of a frame of wood, erected on a pillar or stand, and furnished with movable boards, resembling those of the stocks, and holes through which the offender's head and hands were put. In this position he was exposed for a certain time to public view and insult. The use of the pillory was abolished in France in 1832, in England in 1837, and in the United States in 1839.

PILLSBURY, JOHN ELLIOTT, an American naval officer. He was born at Lowell, Mass., in 1846, and graduated from the U. S. Naval Academy in 1867. He served a year in the Hydrographic office and ten years in coast survey service. In 1884–91 he commanded the coast survey steamer "Blake" investigating Gulf Stream currents and established the axis of stream in Straits of Florida, and off Cape Hatteras. Commanded dynamite cruiser off Santiago in Spanish-American war, later in Boston Navy Yard. Chief of Staff, North Atlantic Fleet in 1905. Released from active duty in 1909. Acted as naval adviser in 1918–1919. Died in 1919.

PILOT FISH, *Naucrates ductor*, a small pelagic fish, about a foot long, of bluish color, marked with from five to seven broad, dark, vertical bars. It owes its scientific and popular English name to its habit of keeping company with ships and large fish, generally sharks. It obtains a great part of its food from the parasitic crustaceans with which sharks and other large fish are infested. Pilot fish often accompany ships into harbor.

PILOT KNOB, a remarkable hill in Missouri, about 86 miles S. W. of St. Louis. It is nearly 500 feet high, and is composed almost entirely of magnetic iron ore.

PILSEN, a town of Bohemia; in a fertile and beautiful valley, 52 miles S. W. of Prague. There are numerous active industries, producing building materials, machinery, metal work, porcelain, spirits, liquors, leather, etc. In the neighborhood are mines of iron, alum, vitriol, coal, and sulphuric acid. But the town is most widely known from giving its name to a popular beer. The town was stormed by Zizka in the Hussite war and by Count Mansfeld in the Thirty Years' War (1618); it was Wallenstein's headquarters in 1633–1634. Pop. about 87,500.

PIMAN, a linguistic stock of North American Indians who occupy a vast area extending over Southern Arizona and Northwestern Mexico. They number about 90,000.

PIMELODUS, a genus of *Siluridæ* having the adipose fin well developed; dorsal and anal short; the former with pungent spine and six rays; barbels six; palate edentulous; ventrals six-rayed, inserted behind the dorsal. Forty species are known from South America, the majority of small size and plain coloration. Two species are from West Africa.

PIMPERNEL, (*Anagallis*), a genus of plants belonging to the natural order *Primulaceæ*. The *A. arvensis*, or field pimpernel, a beautiful annual, is commonly known as the "shepherd's or poor man's weather glass," from the fact that its flowers do not open in rainy weather. The bog pimpernel (*Anagallis tenella*) grows in the drier parts of marshes. The blue and lilac varieties of the *A. collina*, originally a native of South Africa, have been introduced into gardens in Great Britain, where they have a fine effect. The water pimpernel is the *Veronica A.*; the yellow pimpernel, *Lysimachia nemorum*.

PIN, a piece of wood, metal, etc., generally pointed and used for fastening separate articles together, or as a support; a peg, a bolt. Also a small piece of wire, generally brass, headed and pointed, used as a fastening, etc., for dress, or for attaching separate pieces of paper, etc., or as an ornament.

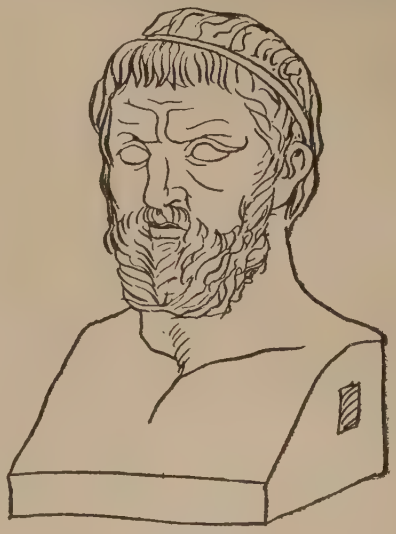
PINACOTHEK, or **PINAKOTHEK**, a name sometimes applied in Germany to galleries of art, especially collections of paintings. The Pinacothek formed at Munich by Louis I. of Bavaria is particularly famous.

PINAR DEL RIO, one of the provinces of Cuba comprising the W. end of the island. It has an area of about 5,000 square miles. A range of mountains runs lengthwise through the province. In the southern slope are the famous tobacco fields of Vuelta Abajo where the finest tobacco in the world is grown. Other products are sugar cane, coffee and fruits. Cotton is also produced in the lowlands. Cattle raising and mining are also of some importance. The capital is the city of the same name. Pop., province, about 275,000; city, about 12,000.

PINCHOT, GIFFORD, forester of the State of Pennsylvania. Born 1865 at Simsbury, Conn., and graduated from Yale in the class of '89. After studying forestry abroad in Germany and Switzerland he became professor of forestry at Yale in 1903. While he held this position he also held office under the United States Government. During Roosevelt's administration Pinchot as chief of the forestry bureau took a leading part in the movement for the preservation of our national resources. He resigned his position in 1911 because of his disagreement with the policies of the Taft administration. Appointed by Governor Sproul in 1920 forester of Pennsylvania.

PINCKNEY, CHARLES COTESWORTH, an American statesman; born in Charleston, S. C., Feb. 25, 1746. He was sent to England and educated at Westminster and at Christ Church, Oxford, read law at the Middle Temple, and studied for a while at the military academy in Caen, France. He afterward settled as a lawyer at Charleston, S. C. He was Washington's aide-de-camp at the battles of Brandywine and Germantown. In 1780 he was taken prisoner at the surrender of Charleston, and held to the close of the war. A member of the convention that framed the Constitution of the United States (1787), he introduced the clause forbidding religious tests as a qualification for office. He declined the secretaryship of war in 1794, and of state in 1795; in 1796 he was sent as minister to France, but the Directory refused to receive him. While on this mission it was intimated that peace might be granted in return for a money payment; he made the reply, "Millions for defense, but not a cent for tribute." In 1800–1808 he was thrice an unsuccessful Federalist candidate for the presidency. He died Aug. 16, 1825.

PINDAR, the great Greek lyric poet; born in or near Thebes, in Bœotia, about 522 B. C. He was of a noble family,



PINDAR

skilled in music, and learned his father's art of flute playing. At Athens he was a pupil of Lasus of Hermione. Pindar composed choral songs for princes and states in all parts of Greece; for which, as was the custom, he received money and gifts. Yet he did not become a mere hireling, and spoke truth fearlessly to all. He did not live at courts, nor

take part in public affairs. Pindar excelled in all varieties of choral poetry, hymns to the gods, pæans, odes for processions, drinking songs, etc. But the only poems of his now extant are the "Epinikia, or Triumphal Odes," composed in celebration of victories at the great public games, the Olympian, Pythian, Nemean, and Isthmian. They are marked by an extraordinary variety of style and expression. No two odes have the same meter. Pindar attained the highest renown in his own age, and as a lyrical poet has no rival. When Thebes was destroyed by Alexander, the conqueror spared the house of Pindar. He died in 443 B. C.

PINDUS, the ancient name of the principal mountain range of Northern Greece, forming the watershed of the country and the boundary between Thessaly and Epirus. It was, like Helicon and Parnassus, a seat of Apollo and the Muses.

PINE, Pinus, a genus of trees of the natural order *Coniferæ*. The Linnæan genus includes all kinds of fir, larch, and cedar; but as now limited the genus *Pinus* is distinguished by monœcious flowers and woody cones with numerous two-seeded scales, the scales having an angular truncated apex. The leaves are linear and very narrow, of a very dark green color, growing in clusters or in pairs, and surrounded by scarious scales at the base. To this genus belong many noble and useful trees. They mostly grow in mountainous or other exposed situations, and their narrow leaves are admirably adapted to evade the force of winds. Many species of pines, some of them very beautiful and very valuable, are found in North America. Besides those long known, and which are found in the States and colonies near the Atlantic, a number of the noblest species of this genus have, during the 19th century, been discovered in California and the N. W. parts of the Continent. The red Canadian pine (*P. resinosa*) is found from Canada to the Pacific, but does not reach far S. in the United States. It is the yellow pine of Canada and Nova Scotia.

PINEAPPLE, the *Ananassa sativa*. The leaves are hard and fibrous, with spiny edges. The flowers rise from the center of the plant, and are in a large conical spike, surmounted by spiny leaves called the crown. The conical spike of flowers ultimately becomes enlarged and juicy, constituting the pineapple, believed to be the finest of fruits. The first particular account was given by Oviedo, in 1535, and it was first cultivated in Holland. More than 50 varieties have been produced.

The plant grows in the S. portion of the United States and in Hawaii. In

PINEAPPLE

the islands they sometimes reach the weight of 17 pounds, though the average weight is six.

PINE BLUFF, a city of Arkansas, the county-seat of Jefferson co. It is about 40 miles S. of Little Rock, on the St. Louis Southwestern and the St. Louis, Iron Mountain, and Southern railroads. It contains the State Colored Normal College, the Merrill Institute, a library, opera house, court house and other public buildings. It is the center of a fertile agricultural community. Cotton is largely grown. It has also an important lumber trade. The industries include railroad shops, cottonseed-oil mills, boiler works and sheet iron works. Pop. (1910) 15,102; (1920) 19,280.

PINE BULLFINCH, or **PINE GROSBEAK**, *Pyrrhula* or *Pinicola enucleator*, a wellknown bird with head, neck, fore part of breast, and rump bright red; back grayish-brown or black, edged with red; lower parts light gray; two white bands on the dusky wings; larger than the bullfinch. Common in the Arctic regions, whence it migrates S. in numbers in the United States, more sparingly in Europe; called also pinefinch and pine grosbeak.

PINE CHAFER, or **PINE BEETLE** (*Hylophagus piniperda*), a species of beetle which infests Scotch pines. It feeds on the young shoots of these trees and eats its way into the heart, thus converting the shoot into a tube.

PINE MARTEN, an animal, *Mustela martes*, distributed over Europe and Asia. The body is long and lithe, about 18 inches, with a tail two-thirds that length; legs short, paws with five digits

armed with claws; snout sharp, vibrissæ long; fur dark brown, lighter on cheeks and snout; throat, and under side of neck light-yellow. It is arboreal, and frequents coniferous woods, whence its popular name. The female makes a nest of moss and leaves, sometimes occupying those of squirrels or woodpeckers and killing the rightful owners.

PINERO, SIR ARTHUR WING, an English dramatist; born in London, May 24, 1855. A lawyer's son, he studied for the law, then became an actor, and ultimately left the stage for dramatic

ARTHUR W. PINERO

authorship. His first comedy, "Two Can Play at That Game," was produced in 1877, and was followed by "Two Hundred a Year" (1877); "The Money Spinner" (1880); "The Magistrate" (1885); "Dandy Dick" (1887); "His House in Order" (1906); "Thunderbolt" (1909); "Mind the Paint Girl" (1912); etc.

PINEROLO, or **PIGNEROL** (province of Turin) a town of North Italy, at the E. foot of the Alps, 23 miles S. W. of Turin. From 1042 a town of Savoy, it was till 1713 strongly fortified, having among other defenses a citadel, in which the Man with the Iron Mask, Lauzun, and Fouquet were imprisoned. This fortress was in French hands from 1536 to 1574, again from 1630 to 1696, from 1704 to 1706, and from 1801 to 1814. The town contains a cathedral and a technical school. Cloth, paper, leather, cotton, and silk are manufactured. Pop. about 13,000.

PINES, ISLE OF, an island S. of Cuba belonging to that country. It is about 40 miles S. E. of the S. coast of the province of Pinar Del Rio. Its total area is about 840 square miles. The production of fruits is the principal industry, although there is extensive cattle raising. In recent years large numbers of people from the United States have settled on the island and tentative efforts have been made to have it come into possession of the United States. The capital is Nueva Gerona. Pop. about 3,500.

PING-PONG, table lawn tennis, a game that was introduced from England and became very popular in the United States in 1902. The game is played very much as is the regular game of tennis. Across the center of a table a net about six inches high is stretched; the rackets and balls are proportionately small, the former being strung with fine gut, or formed from a single piece of vellum stretched tightly over a racket frame; and the latter being made of celluloid. The scoring is the same as in tennis.

PINGUICULA, a genus of plants of the natural order *Lentibulariaceæ*, with rosettes of fleshy radical leaves, and solitary purple, violet, or yellow flowers.

PINK, in art, a class of pigments of yellow or greenish-yellow color, prepared by precipitating vegetable juices on a white earth, such as chalk, alumina, etc., and used only in water colors. The varieties are Italian pink, brown pink, rose pink, and Dutch pink.

In botany, the genus *Dianthus*, of about 70 known species. The majority are cultivated in gardens; specifically, *Dianthus plumarius*, the garden pink. Also various plants superficially resembling it in flowers; thus, the cushion pink is *Silene acaulis*, the moss pink, *Phlox subulata*.

PINK-EYE, a highly contagious disease in horses.

PINKIE, a battle fought on Sept. 10, 1547, near Musselburgh in Midlothian, Scotland, between 14,000 English under the Protector Somerset and twice that number of Scotch. The latter were utterly defeated, more than 10,000, it is said, being killed on the field and in the pursuit, while the English loss was barely 200.

PINKNEY, WILLIAM, an American diplomatist; born in Annapolis, Md., March 17, 1764; was admitted to the

bar in 1786; was a member of the Legislature of his State that ratified the Constitution of the United States. In 1796 Washington appointed him a commissioner to determine the claims of American merchants to compensation for losses and damages caused by the English government. In 1806 he was sent with James Monroe to treat with the English government regarding violations of the rights of neutrals and was resident minister in London in 1807–1811, when President Madison appointed him attorney-general of the United States. In 1816 he was appointed minister to Russia and special envoy to Naples. In 1820 he was elected to the United States Senate. He died in Washington, D. C., Feb. 25, 1822.

PINKROOT, *Spigelia marilandica*, a medicinal herb found in the United States.

PINNA, a genus of *Aviculidæ;* shell sometimes two feet long, equivalve; umbones anterior, posterior side truncated and gaping; hinge, edentulous; animal with a doubly fringed mantle and an elongated grooved foot; shell attached by a strong byssus spun by the animal; sometimes mixed with silk and woven into gloves; known species, recent, 30 from the United States, Great Britain, the Mediterranean, Australia, etc.

PINNACE, a man-of-war's boat, next in size to the launch; it is carvel built, usually from 28 to 32 feet long, has a beam .29 to .25 of its length, and is rowed by six or eight oars. Also, a small schooner-rigged vessel provided with oars or sweeps.

PINNACLE, an ornament placed on the top of a buttress as a termination to an angle or gable of a house, church, or tower; any lesser structure of any form rising above the roof of a building, or capping and terminating the higher parts of other buildings or of buttresses. Pinnacles are frequently decorated, and have the shafts formed into niches, paneled or plain.

PINNATE, a botanical term meaning divided into several or many smaller leaves or leaflets; having simple leaflets arranged on both sides of a common petiole. In zoölogy, a term meaning shaped like a feather; having lateral processes. Also, provided with fins.

PINNATED GROUSE, known also as the prairie hen, or prairie chicken. The male is remarkable as possessing two erectile tufts in the nape, and an air bladder (connected with the windpipe, and capable of inflation) on each side of the neck, in color and shape resembling small oranges; general plumage brown, mottled with a darker shade; habitat, prairies of the Mississippi valley, from Louisiana N.

PINNIGRADA, or **PINNIPEDIA**, a section of the carnivorous order of mammals, in which the fore and hind limbs are short, and are expanded into broad webbed swimming paddles. The section comprises the seals and walruses.

PINOCLE, PINOCHLE, or **PENUCHLE**, a game of cards very popular in the United States, particularly among German-Americans. The object of the game, which may be joined in by either two, three, or four persons, is to secure 1,000 points. The game is played with two full packs of cards, mixed, from which the twos, threes, fours, fives, sixes, sevens, and eights have been taken. This is the schedule of "points" or "melds":

Eight aces count	1,000
Eight kings count	800
Eight queens count	600
Eight jacks count	400
Ace, ten, king, queen, and jack of trumps count	150
Four aces of different suits count	100
Four kings of different suits count	80
Two queens of spades and two jacks of diamonds (double pinochle) count	80
Four queens of different suits count	60
Four jacks of different suits count	40
Queen of spades and jack of diamonds (pinochle) count	40
King and queen of trumps (royal marriage) count	40
King and queen of a suit not trumps (marriage) count	20
Nine spot of trumps counts	10

The relative value of the cards is: Ace counts for 10 points, 10 spot counts for 10 points, king for five, queen for five. The last trick counts 10 points for the player who takes it. The total points, therefore, of the cards and last trick combined amount to 250. Four-handed pinochle is usually played two against two as partners, sitting opposite one another. The cards are all dealt out, four at a time, each player receiving 12, and the last card is turned up for trump. If a nine is turned up the dealer is credited at once with 10 points; if any other card is turned up either of the other players who holds a nine of trumps may exchange it for the trump card and claim 10 points, the player sitting on the left-hand side of the dealer having the preference. Each player then melds whatever he has in his hand and the partners score together. The eldest hand then leads a card for the first trick. In every trick each player must follow suit; if he cannot he must trump; if neither is possible, he may play any card he pleases; if trump is played, he must beat the card with a higher one, if possible; the player who

takes the trick leads for the next. When either side reaches 1,000 points the scorer calls "game," and the balance of the hands are void.

PINSK, a town of west Russia, standing in the midst of what were formerly vast marshes (in large part drained since 1875), on a branch of the Pripet, 98 miles E. of Brest-Litovsk; it manufactures leather, and has a large transit trade. Pop. about 40,000. It was captured in 1915 by the Germans.

PINT, a measure of capacity used both for dry and liquid measures. It contains 34.65925 cubic inches, or the eighth part of a gallon. In medicine it is equivalent to 12 ounces.

PINTAIL DUCK, a species of *Querquedula; Q. acuta*, or *Dafila caudacuta*, having the upper parts and flanks ash,

PINTAIL DUCK

with narrow stripes of black; under parts white; head umber-brown; tail pointed. It inhabits the N. of Europe and America.

PINTURICCHIO (pĭn-tû-rĭk'yō) ("the little painter"), an Italian painter of the Umbrian school, whose real name was Bernardino di Betto; born in Perugia, Italy, in 1454. At Rome he was engaged on the frescoes of the Sistine Chapel, being at this time under the influence of Perugino. His chief work was a series of mural paintings illustrating the life of Pope Pius II. in the cathedral library at Siena. There are also fine frescoes by him in the Buffalini Chapel of the Church St. Maria in Aracœli, Rome. He left many exquisite altar pieces; he never painted in oil. He died in Siena, Italy, Sept. 11, 1513.

PINZON, ALONZO, VINCENTE, YAÑEZ and MARTIN (brothers), Spanish navigators, who had commands in Columbus' first voyage, and by whose exertions mainly it was that a sufficient number of men were induced to risk their lives on this perilous enterprise. Vincente Yañez was the more distinguished of the brothers; he made several voyages, on the most important of which he sailed in December, 1499, and discovered Brazil and the river Amazon, three months before Cabral took possession of South America for the crown of Portugal.

PIOMBI, the notorious roof cells (*sotto piombi*, "under the leads") of the state prisons of Venice, in which Casanova and many other notable prisoners were confined.

PIONEER, one of a body of soldiers equipped with pickax, spade, etc., whose duty it is to clear and repair roads, bridges, etc. Also, one who goes before to prepare or clear the way, or remove obstructions for another, especially in the settlement of a new region.

PIOTRKOW, a town of Russian Poland, 87 miles S. W. of Warsaw. Cotton and wool spinning is largely prosecuted. It is one of the oldest Polish towns; here in the 15th and 16th centuries diets were held and the kings elected. Pop. about 45,000. The place was captured by the Germans in 1915.

PIP, a disease in fowls, consisting in a secretion of thick mucus from the tongue and lining membranes of the mouth, by which the nostrils are stuffed and clogged.

PIPA, a genus of Batrachian reptiles, closely allied to the common toad, but distinguished by the body being horizontally flattened, the head large and triangular, tongue wanting, tympanum concealed beneath the skin, the eyes small, placed near the margin of the upper jaw. The best known species is the Surinam toad, *P. Surinamensis*, which is considerably larger than the common toad. The pipa lays its eggs in the water, after which they are collected by the male, and placed on the back of the female, the skin enlarging in such a manner as to inclose the eggs in cells; here the development goes on till the young come forth as perfectly formed toads.

PIPE, a long hollow body or tube, made of various materials, as earthenware, iron, lead, copper, glass, etc. The name is applied especially to tubes for the conveyance of water, gas, steam, and the like. Also a wind instrument of music, consisting of a tube of wood or metal. The tubes of an organ are called organ pipes or pipes.

Also, a running vein in a mine, having a rock root and sole, and called a pipe vein.

PIPE CLAY, a variety of clay adapted by its plasticity and freedom from impurities for the manufacture of pipes.

PIPE FISH, a popular name for any individual of the family *Syngnathidæ*. *Siphonostomata typhle* is the broad-nosed pipefish; *Nerophis æquoreus*, the ocean pipefish; *N. lumbriciformis*, the worm, or little pipefish; and *N. ophidion*, the straight-nosed pipefish.

PIPE LINE, one of the most remarkable of modern devices for lessening the cost of transportation of petroleum. At first the crude oil was transported from the wells to the refineries on barges and flatboats. Later, railroads obtained much of this business. About 1870 wooden tank cars were displaced by cars with tanks constructed of boiler iron. These tank cars are still in use to a large extent. The practicability of a line of tubing was suggested by Gen. S. D. Karns of Parkersburg, W. Va. In 1872 a Mr. Hutchinson laid down a short line of pipe on the siphon principle from the Tarr farm to the first refinery erected in the oil country at Plumer. In 1875 the first successful pipe line was laid by Samuel Van Sycle from Pithole to Miller's farm. Next came an effort to construct a pipe line from the wells to the seaboard, and in 1875 the Pennsylvania Transportation Company was authorized to construct a pipe line from the oil regions to tide water. Generally, to avoid the extremes of heat and cold, the pipes are buried under the surface of the ground about two feet. They are laid on a bee line, and follow the face of the country to tide water. The pumping stations are located at central points in the valleys along the various lines. Each pipe line section is patrolled by a lineman, and the smallest leakages are quickly detected and righted. To remove sediment and other deposits an automatic scraper is introduced into the pipes, the oil pressure forcing the scraper along from one station to the next, the sound of its travel being thoroughly audible to the lineman who follows it in its passage.

PIPING CROW, the *Gymnorhina tibicen*, a bird from New South Wales. It has great powers of mimicry; called also the flute player. Also the *Gymnorhinnæ*, a sub-family of *Corvidæ*, with five genera.

PIPPIN, a name given to several varieties of apples. Normandy pippins are apples dried in the sun and stored for winter use.

PIQUA, a city of Ohio in Miami co., about 70 miles N. W. of Columbus. It is on the Miami river, the Miami and Erie canal, the Cincinnati, Hamilton, and Dayton, the Pittsburgh, Cincinnati, Chicago, and St. Louis, and the Western Ohio railroads. Among its important edifices are a library, Federal Building, and Ball Memorial Hospital. The city has important industries including sheet steel works, iron works, stove works, woolen mills, etc. Pop. (1910) 13,388; (1920) 15,044.

PIQUE, a French material, made of two cotton threads, one thicker than the other, which are woven, and united at certain points, and there made an extra thickness.

PIQUET, a game of cards played between two persons with 32 cards—viz. the four honors and the highest four plain cards of each suit. The cards are shuffled and cut as in whist, and then dealt, two by two, till each player has 12, and the remaining eight, called the "talon," or stock, are then laid on the table. The first player must then discard from one to five of his cards, replacing them with a similar number from the talon; and after him the younger hand may discard if he pleases, similarly making up his proper number from the remaining cards of the talon. The player who first scores 100 wins the game, and the score is made up by reckoning in the following order: carte-blanche, the point, the sequence, the quatorze, the cards, and the capot. "Carte-blanche" is a hand of 12 plain cards, and counts 10 for the player who possesses it. The "point" is the greatest number of cards in any suit, or, if the players are equal in this respect, that which is highest in value (the ace counting 11, each court card 10, and the plain cards according to the number of pips), and counts a number equal to the number of cards in the suit. The "sequence" is a regular succession of three or more cards in one suit, and the highest sequence (*i. e.*, the one containing the greatest number of cards, or, if the players have sequences equal in this respect, the one of the two which begins with the highest card), if of three cards, counts three; of four cards, four; of five cards, 15; of six cards, 16; etc. The "quatorze" is a set of four equal cards, (not lower than tens), as four aces, four queens, etc., and the highest quatorze counts 14 for its holder; but should neither player have a quatorze, then the highest set of three is counted instead, but it reckons only three. The possessor of the highest sequence or the highest quatorze also counts all inferior sequences and quatorzes (including sets of three); while his opponent's sequences and quatorzes go for nothing.

The first player reckons his points and plays a card; the dealer then reckons his points, and follows his opponent's lead, and the cards are laid and tricks are taken as in any ordinary card game. Each player counts one for every card he holds, and the taker of the trick (if second player) counts one for it; the possessor of the greater number of tricks counting 10 in addition (the "cards"), or if he takes all the tricks, he counts 40 in addition (the "capot"). If one player counts 30—*i. e.*, 29 by his various points, and one for the card he leads, before his adversary has counted anything, he at once doubles his score, reckoning 60 instead of 30 (this is called the "pique"), and should his score reach 30 before he plays a card, or his adversary begins to count, he mounts at once to 90 (the "repique").

PIRACY, the act, practice, or crime of robbing on the high seas. Other offenses have, by various statutes, been made piracy, and liable to the same penalty. Thus trading with, or in any way aiding, known pirates, is piracy. So, too, any commander or seaman of a ship who runs away with any ship, boat, goods, etc., or who voluntarily delivers such up to any pirate, is guilty of piracy. Anyone who conveys or removes any person as a slave is also by statute law of most civilized nations guilty of piracy. The penalty formerly was death, whether the guilty party were a principal, or merely implicated as an accessory before or after the fact, but now is reduced to imprisonment. Also, literary theft; an infringement of the law of copyright.

PIRÆUS, called also PORT DRACO, the harbor of both ancient and modern Athens. Planned by Themistocles and laid out by Hippodamus of Miletus, the Piræus was built in the glorious days of Pericles; this ruler and Cimon before him built the three "long walls" that connected Athens with its port (5 miles to the S. W.) and so insured a free and safe passage from one to the other at all times. Its arsenal (built 347–323 B. C.) and fortifications were destroyed by Sulla in 86 B. C., and from that time the town sank into decay. The modern Piræus, which has grown up since 1834, is regularly laid out with a naval and a military school, arsenal depots, and manufactures cottons, flour, paper, iron, nails, carts, furniture, etc., and is growing rapidly. A railway connects it with Athens. More than half the trade of Greece is through this port, which is also an important manufacturing center. Pop. about 75,000.

PIRAI, or PIRAYA, the *Serrasalmo Piraya*, a voracious fresh-water fish of tropical America. It is three or four feet in length, and its jaws are armed with sharp lancet-shaped teeth, from which cattle when fording rivers sometimes suffer terribly.

PIRANO, a city of Austria, situated on the Bay of Largone. It is in the former Crownland of Istria. There is a castle, dockyards, and the city before the World War had some commercial importance. Wine, oil, soap and chemical products were manufactured. The salt works are among the most important in Austria.

PIRMASENS, a town of the Bavarian Palatinate, and formerly the chief town of the county of Hanau-Lichtenberg, 34 miles W. of Landau; chief manufactures, shoes and musical instruments. Close by, the Prussians under the Duke of Brunswick defeated the French commanded by Moreau on Sept. 14, 1793. Pop. about 40,000.

PIRNA, a town of Saxony; on the left bank of the Elbe, 11 miles S. E. of Dresden. It contains a fine 16th century church; a castle (1573), used as a lunatic asylum since 1811, and manufactures of glass, chemicals, tobacco, stoves, etc. Eight thousand men are employed in the sandstone quarries. Pop. about 20,000.

PIROT, a town of Servia, situated on the railroad from Belgrade to Sofia, near the Bulgarian frontier. Near the beginning of the World War the town was captured by an Austro-Germanic force. Pop. about 10,000.

PIRRIE, WILLIAM JAMES, BARON, an Irish shipbuilder. He was born in Quebec in 1847, and studied there and at Glasgow, becoming draftsman with Harland and Wolff at Belfast, of which he became head. Some of the biggest ships in the world have been turned out there, among them the White Star liners "Oceanic," "Olympic," "Titanic." He was Lord Mayor of Belfast in 1896. He is a strong supporter of Irish self-government in a stronghold of its opponents. In 1906 he was made baron and in 1910 a member of the Order of St. Patrick. During the World War he turned his yard over for the construction of warships.

PISA, a city of central Italy, capital of the province of Pisa, on the Arno, 8 miles from its mouth, 13 miles N. E. of Leghorn, and 50 miles W. of Florence. The walls are 5 miles in circuit. The Arno flows through the city, and is crossed by several bridges, the principal

one being of fine marble. The cathedral, with its attendant buildings, the baptistery, the cemetery, and the belfry is perhaps, the finest specimen that exists of the style of building called by the Italians the Gotico-Moresco. The most remarkable buildings in Pisa are the Campo Santo, and the stately belfry, or campanile, a cylindrical tower, 178 feet in height, constructed of successive rows of pillars, chiefly of marble; it is extremely graceful in its proportions; but its chief peculiarity consists in its inclination about 14 feet out of the perpendicular, whence it is commonly called the Leaning Tower of Pisa. The University of Pisa is one of the oldest in Italy; it has 56 professors and about 1,000 students. Galileo, who was a native of Pisa, was formerly one of the professors. A library, botanical garden, a cabinet of natural history, and an observatory are connected with the university. Pisa is supposed to have been founded shortly after the Trojan War. It became a Roman colony about 179 B. C., but did not attain to distinction before the 10th century, when it became the leading commercial republic of Italy. During the 11th century it maintained its superiority in the Mediterranean, materially assisting the French in the Crusades. A war with Genoa ended in the ruin of Pisa in 1284. The city afterward became the prey of various factions, till finally united to Florence in 1406. Pop. about 70,000.

THE BAPTISTERY, PISA

PISA, COUNCIL OF, a church council generally included in those called ecumenical, met and opened in Pisa March 25, 1409, and the 23d and last session of which was held Aug. 7 following. Its aim was to end the schism which had divided the Western Church for 30 years; and with this view the leading cardinals, finding that neither of the rival Popes, Gregory XII. and Benedict XIII., would keep their promises to abdicate, had set aside the claims of both, and themselves convoked a general council. It was attended from first to last by 24 cardinals, 4 patriarchs, 80 bishops, 102 proctors of bishops, 87 abbots, 200 delegates of abbots, besides many generals of orders, doctors, deputies of universities, and ambassadors. After the rival Popes failed to appear in obedience to its summons, the council formally tried the claims of both in turn, and deposed them as schismatics and heretics. The cardinals then formed themselves into conclave and elected Cardinal Philargi, who assumed the name of Alexander V. But the council, instead of getting rid of the contending Popes, had only added a third, and the faithful continued to be distracted in their allegiance for eight years longer, down to the time of the Council of Constance.

PISA, UNIVERSITY OF, an ancient university located at Pisa, Italy. Founded in 1338 by students and professors from the University of Bologna. When

Pisa lost its independence in 1406 the university closed its doors, but was re-established by the famous Lorenzo de' Medici a few years later. In 1544 the first botanical institute in Europe was founded here. The University suffered in prestige during the two succeeding centuries and not until Grand Duke Leopold of Tuscany in 1808 endowed it handsomely did it recover. During the reaction in 1849-1850 in Italy it was forced to close down some of its departments, but since that time it has been reckoned among the greatest of Italian universities. Its library is world-famous, having 202,976 volumes, 97,302 pamphlets and 1,814 manuscripts.

PISAGUA, a small port of the now Chilean province of Tarapacá, 40 miles N. of Iquique. It was bombarded and was the scene of much fighting during the Chilean civil war in 1891.

PISANO, the surname of several distinguished artists of Pisa, very important in the early history of art in Italy. GIUNTA PISANO, or GIUNTA DI GIUSTINO of Pisa, is the earliest known Tuscan painter, lived in the 13th century. Giunta was anterior to Cimabue, and to him belongs the merit of reviving painting in Italy. NICCOLA PISANO, born about 1206. He was equally distinguished as sculptor and architect, and must hold the same rank in the former art that Giunta does in painting. He distinguished himself as early as 1225 at Bologna, where he executed the tomb of San Domenico. Niccola was also a great architect; he executed the church of the Frari at Venice; he was the pioneer of the Renaissance in Italy, in sculpture and in architecture. He died in 1278. GIOVANNI PISANO, the son and assistant of Niccola, and likewise one of the greatest of the early sculptors and architects of Italy; born in Pisa in 1240, died in Pisa in 1320, and was placed in the same tomb with his father in the cemetery of Campo Santo, which he designed. ANDREA PISANO was another early artist of Pisa, but nearly a century later than Giunta: he was a sculptor and architect, and the friend of Giotto. Andrea was born about 1270. Of several works still extant by Andrea, the bronze gates of the Baptistery of St. John at Florence are the most important. These two gates are still perfect; the exact date of their execution is disputed, whether they were finished in 1330, or only commenced in that year. The city gates and towers were also of his designing, as well as several important buildings. He died in Florence, in 1349.

PISCATAQUA, a river which constitutes part of the boundary between Maine and New Hampshire, and forms at its mouth the excellent harbor of Portsmouth.

PISCES, in astronomy, the 12th and last of the zodiacal constellations. It is a large constellation, bounded on the E. by Aries and Triangulum, on the W. by Aquarius and Pegasus, on the N. by Andromeda, and on the S. by Cetus. The two fishes are represented on celestial globes and maps as separated some distance from each other, and as having their tails connected by a string. One is under the right arm of Andromeda, the other under the wing of Pegasus. About 40 stars are visible to the naked eye. Bode marks the position of 257; the largest, Alpha Piscium, is of magnitude 3½, and is a double star, one constituent being pale green and the other blue. Also the portion of the ecliptic from which precession has made the constellation move away. The sun enters it, crossing the equator, at the vernal equinox.

PISCICULTURE. See FISH CULTURE.

PISGAH, a name that seems to have applied generally to the mountain range or district to the E. of the Lower Jordan, identical with, or itself a part of, the mountains of Abarrim (Deut. xxxii: 49; xxxiv: 1), one of the summits of which is Mount Nebo (the modern Neba), 2,644 feet above the level of the Mediterranean. From this point Moses enjoyed his glimpse of the Promised Land, in early spring.

PISHIN, a district of southern Afghanistan (British Beluchistan after the Afghan War), just N. of Quetta, which has been governed by a political agent of the governor-general of India since 1878. The British occupied it on account of its great strategical importance; it is the meeting-place of several roads, practicable for troops but not for wheeled carriages, leading from Sind and Punjab to Kandahar. The district—area, 3,600 miles; elevation, 5,000 feet—consists of alluvial valleys separated by range of hills, the whole sloping S. W. and surrounded by mountain chains that reach N. and S. 11,000 feet. The people, partly settled, partly nomad, grow wheat, barley, maize, millet, lucerne, watermelons, and muskmelons, and trade in horses to India. Pop. about 450,000.

PISISTRATUS, a citizen of Athens who raised himself to the sovereign authority in the time of Solon (to whom he was related) 560 B. C. Compelled to

retire from the city by the conspiracy of Magacles and Lycurgus, he returned soon after by effecting a compromise, but was obliged to retire again, and suffer an exile of 11 years. In the 11th year he reappeared at the head of an army and regained his power, which he retained till his death, 527 B. C. He was a beneficent ruler, and did much to promote the rise of Greek literature. We owe to him the poems of Homer in their present form, Pisistratus having collected them.

PISO, an eminent Roman family, which produced some great men, as: PISO, LUCIUS CALPURNIS, surnamed Frugalis, on account of his frugality, consul 149 B. C., who terminated the war with Sicily. He composed annals and orations, which are lost. PISO, CAIUS, consul 67 B. C., author of a law to restrain the factions which usually attend the election of the chief magistrates. PISO, CNEIUS, consul under Augustus, and governor of Syria under Tiberius, in which situation he behaved with great cruelty. He was charged with poisoning Germanicus; on which account he destroyed himself, A. D. 20. PISO, LUCIUS, a senator, who attended the Emperor Valerian into Persia in 258. On the death of that emperor he assumed the imperial title; but was defeated by Valens, who put him to death in 261.

PISTACIO NUT, the fruit of the *pistacia vera*. The kernel is very oily, of a peculiar flavor and bright green in color, and is much used in confections, etc.

PISTIL, the female organ in plants, standing in the middle of the stamens, around which again stand the floral envelopes.

PISTILLIDIUM, a name given to certain small, sessile, ovate bodies in the fructification of mosses, enveloped in a membrane tapering upward into a point. When abortive they are called paraphyses.

PISTOIA, or **PISTOJA** (ancient Pistoria), a town of Italy; 20 miles N. W. of Florence, on a spur of the Apennines. Its streets are thoroughly Tuscan, and it is surrounded with walls, pierced by five gates, and has a citadel. The chief buildings are the cathedral of San Jacopo (12th and 13th centuries), containing a magnificent altar of silver (1286–1407) and several good pictures; the church of St. Bartholomew, with a fine white marble pulpit by Guido of Como (1250); St. Andrea, with Giovanni Pisano's pulpit (1301); St. John, with a font by Giovanni Pisano and terra cottas by Andrea della Robbia; the 14th century communal palace; and other palaces. The principal manufactures are iron and steel wares, and firearms—the word "pistol" in all probability takes its name through pistolese, "a dagger," from Pistoia (Pistola). Here Cataline was defeated in 62 B. C. The town was conquered by Florence and Lucca in 1306. Pop., commune about 70,000; town, about 14,000.

PISTOL. See FIREARMS.

PISTOLE, a gold coin once current in Spain, France, and the neighboring countries; average value about $3.85.

PISTON, in machinery, a device so fitted as to occupy the sectional area of a tube and be capable of reciprocation by pressure on either of its sides. It may be of any shape corresponding accurately to the bore of the tube; but the cylindrical form is almost exclusively employed for both, as in the common pump and the steam engine. One of its sides is fitted to a rod, to which it either imparts reciprocatory motion, as in the steam engine, or by which it is itself reciprocated, as in the pump. In the former case, it has no opening leading from one side to the other, and is termed solid, though generally not really so; but in the latter, an aperture controlled by a valve permits the passage of the fluid from one side to the other during its downward movement; except in force pumps. A distinction is made in pumps; the solid piston being known as a plunger; the hollow piston as a bucket. The piston usually requires packing to cause it to fit closely within its cylinder and at the same time allow its free backward and forward movement.

PITA FLAX, flax made from the fiber of the *Agave Americana* (called also maguey), and used for twine, rope, hammock meshes, etc. In Mexico it is also used for oakum. Labillardière found that its strength is to that of common flax as 7 to 11¾.

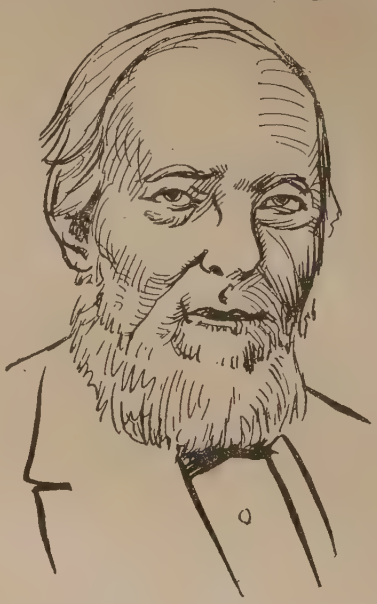
PITCAIRN, a borough of Pennsylvania, in Allegheny co. It is about 15 miles E. of Pittsburgh on the Pennsylvania railroad. There are railroad shops and yards, machine shops and foundries, and electrical supply works. There are important coal mines in the neighborhood. Pop. (1910) 4,975; (1920) 5,738.

PITCAIRN ISLAND, a solitary island in the Pacific Ocean, between Australia and South America, in lat. 25° 3′ S. and lon. 130° 8′ W., measures 2½ miles by 1 mile. It was discovered by Carteret in 1767, and was at that time uninhabited. In 1790 it was taken pos-

session of by nine of the mutineers of H. M. S. "Bounty," with six Tahitian men and 12 women, the ringleader being called Christian. Four years later the native men one night murdered all the Englishmen, except Alexander Smith, who afterward assumed the name of John Adams. Thereupon the women, in revenge, murdered all the Tahitian men. At the end of 10 years John Adams was left alone, with eight or nine women and several children; and from them the present inhabitants (126 in 1890) are descended. Adams, changed by these tragic adventures, set about the education of his companions in Christian principles. The little colony was unknown to the world till 1808, when it was "discovered" by Captain Folger of the American sealing ship "Topaz"; the first British vessel to visit it did not arrive till 1814. The islanders were visited again in 1825 and 1830, and in 1831, as their numbers had rapidly increased (to 87), they were at their own request removed to Tahiti by the British Government. But, disgusted by the undesirable customs of their Tahitian relatives, the most of them went back to Pitcairn Island. The island was annexed to Great Britain in 1839. Nearly 200 of the islanders were transferred to Norfolk Island in 1856, but a number of them afterward returned. Pitcairn Island enjoys a lovely climate; its mountainous surface reaches 1,008 feet in Outlook Ridge; the soil is fertile, and produces yams, cocoanuts, bread fruit, sweet potatoes, bananas, etc. Pop. (1914) adults, 140 males, 39 females; children, 66.

PITCH, a term applied to a variety of resinous substances of a dark color and brilliant luster, obtained from the various kinds of tar produced in the destructive distillation of wood, coal, etc. In architecture, the rise or versed sine of an arch. In carpentry, the inclination of a roof. The common pitch has a rafter three-quarters the length of the span; the Gothic has a full pitch; the rafters being the length of the span; the Greek has a pitch ⅓ to ⅓ of the span; the Roman has a pitch from ⅓ to ⅔ of the span; and the Elizabethan has rafters longer than the span.

In hydraulic engineering, in overshot water wheels the bucket-pitch is a circular line passing through the elbows of the buckets. The elbow is the junction of the floor and the arm, which together form the bucket. In machinery: (1) the distance between the threads of a screw measured on a line parallel to the axis. (2) The distance between the centers of two adjacent teeth in a cog-wheel, measured on the pitch circle. (3) The pitch of a rivet is the distance apart from center to center. (4) The distance between the stays of marine and other steam boilers. In marine boilers it is usually from 12 to 18 inches. In mining, a lode or portion of



SIR ISAAC PITMAN

a lode let out to men to work by the piece or by a percentage of the output.

In music, musical sounds give to the mind a feeling of acuteness or gravity according to the rapidity or slowness of the vibrations producing them; hence, the former are called acute or high, the latter grave or low. The absolute pitch of sounds is measured by giving the number of vibrations per second which produces a given sound, *e. g.*, C = 528; the relative pitch of sounds is described by giving the ratio of vibrations of the interval, *e. g.*, a fifth is 2:3—that is, the higher sound of any interval of a fifth gives three vibrations, while the lower sound in the same time gives two. The determination of fixed pitch is purely arbitrary, and it has from time to time undergone great variations. In England we have high concert pitch C = about 540, more or less, and the medium pitch C = 528; on the Continent the French "diapason normal," C = 518, is being largely adopted. The official standard adopted in the United States during the world's fair was what is known as international or "French" pitch, which gives as a standard middle A with 435 vibrations, though the majority of American

upright pianos are tuned to high concert pitch.

In planes, the slant of a plane bit in its stock. In printing, one of the guide pins, which, in floor-cloth printing, answers the purpose of the register points. In shipbuilding: (1) The pitch of the paddles is the distance between them, measured on the circle which passes through their centers. It is commonly from 1.6 to double their depth. (2) The pitch of a propeller-screw is the length, measured along the axis, of a complete turn. A gaining-pitch is one in which the pitch gradually increases from the leading to the following edge.

PITCH BLENDE, a mineral chiefly found in Saxony and Cornwall, composed of 86.5 oxide of uranium, 2.5 black oxide or iron, galena, and silex. In color it varies from brown to black, and occurs globular, reniform, massive, disseminated, and pulverulent. Sp. gr. 7.5. It generally accompanies uranite. Radium is extracted from it.

PITH, the cylindrical or angular column of cellular tissues at or near the center of the stem of a plant, also called the medulla. When examined microscopically it presents in section a union of cells resembling those of a honeycomb, of which a good example is afforded by Chinese rice paper, the pith of the *Aralia papyrifera*.

PITHECANTHROPUS ERECTUS, the name given to the fossil remains of a prehistoric animal found in Java, and which represent a form intermediate between man and the higher apes.

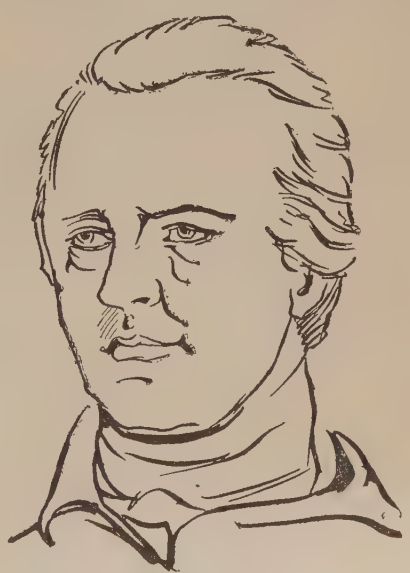
PITMAN, BENN, an American phonographer, born in Trowbridge, England, July 24, 1822; brother of Sir Isaac Pitman, the inventor of phonography; was educated in his brother's academy; lectured and taught phonography throughout Great Britain for 10 years. He came to the United States in 1853, and founded the Phonographic Institute in Cincinnati; invented the electro-process of relief engraving in 1856; was military recorder of State trials during the Civil War. His works include "Manual of Phonography"; "History of Shorthand"; and "Phonographic Dictionary." He died in 1910.

PITMAN, SIR ISAAC, an English stenographer; born in Trowbridge, England, Jan. 4, 1813. He was master of the British School of Barton-on-Humber in 1831, established the school at Wotton-under-Edge in 1836 and removed to Bath in 1839. He was the inventor of the phonetic system of short-hand writing and published his first treatise on the subject entitled "Stenographic Soundhand," in 1837; "Phonography" (8th edition, 1840); and "Phonographic Reporter's Companion" (1853). He was the head of the Phonetic institute at Bath, and was identified with the spelling reform. He was knighted in 1894, and died Jan. 22, 1897.

PITNEY, MAHLON, a Justice of the United States Supreme Court. Born at Morristown, N. J., 1858, and graduated from Princeton in the class of '79. After that date he practiced law at Morristown, and from 1895–1899 served in Congress as a Republican representative. From 1901 to 1908 he was associate justice of the Supreme Court of New Jersey, and in 1909 became Chancellor of the State. President Taft appointed Pitney to the Supreme Court, Mar. 13, 1912.

PITT, WILLIAM. See CHATHAM.

PITT, WILLIAM, an English statesman; born in Hayes, England, May 28, 1759; second son of the Earl of Chatham; was educated at Cambridge University; studied law and was elected to Parliament in 1780. He was as strongly opposed to the American War as was his



WILLIAM PITT

father. In 1783 he became prime minister; was active in the negotiations of peace with the United States, and was instrumental in the passage of many important measures. Retiring in 1801, he was recalled to office when the Peace of Amiens was broken and war with Napoleon again brought on. Through his

public career he was noted as a parliamentary leader and orator. He died in Putney, England, Jan. 23, 1806.

PITTACUS, one of the seven sages of Greece; born in Mitylene, in the island of Lesbos, about 650 B. C. He was a warrior as well as a philosopher, expelled the tyrant Melantheus from Lesbos; and on becoming its sovereign, 590 B. C., discharged the duties of his station in the most exemplary manner; retired after a reign of 10 years, and died 570 B. C.

PITTMAN, KEY, United States Senator from Nevada. Born at Vicksburg, Miss., 1872 and began the practice of law in Seattle, Wash., at twenty years of age. When the search for gold occurred in the Klondike region he joined in the movement and worked for two years as a miner. During this period he fought the corrupt governments established in many Alaskan towns and fought for the miners in the courts against attempts to defraud them of their rights. In 1901 he removed to Tonopah, Nev. In January, 1913, he was elected as a Democrat to the United States Senate and re-elected 1917.

PITTSBURG, a city of Kansas in Crawford co., about 130 miles S. of Kansas City. It is on the Atchison, Topeka and Santa Fe, the Missouri Pacific, the St. Louis and San Francisco, the Joplin and Pittsburg, and the Kansas City Southern railroads. The city is in an extensive coal mining region. Among its industries are foundry and machine shops, lumber mills, packing houses, etc. There is a public library, a State normal manual training school. Pop. (1910) 14,755; (1920) 18,052.

PITTSBURGH, a city, port of entry, and county-seat of Allegheny co., Pa., at the confluence of the Monongahela and the Allegheny rivers, at the head of the Ohio river, and on the Pennsylvania System, the Baltimore and Ohio, the New York Central, the Wabash, and other railroads; 353 miles W. of Philadelphia; area, 41.61 square miles; pop. (1890) 238,617; (1900) 321,616; (1910) 533,905; (1920) 588,343.

Municipal Improvements.—The city owns a waterworks system, costing over $7,000,000. The filtration plants have a storage capacity of 230,000,000 gallons, and the water is distributed through nearly 750 miles of mains. There are in all about 1,000 miles of streets paved. The sewer system covers 650 miles. There are over 500 miles of street railways.

Notable Buildings.—The principal public buildings are the Allegheny court house; the Carnegie Foundation, including the Carnegie Institute, Museum of Art and Science, the Allegheny county court house, St. Paul's Cathedral, and many other churches; Masonic Temple; Eighteenth Regiment Armory; and the Pittsburgh Athletic Club. There are also many fine business edifices, hotels and theaters; the United States Bureau of Mines.

Manufactures.—The two chief industries are the production of iron and steel; but there are many other flourishing manufactures. The city is well known as the Iron City, for there is nothing in the iron industry which is not here manufactured, including locomotives, bridges, shafting, brakes, all sizes of nails, and the most delicate watch springs. There are in Pittsburgh beside blast furnaces and iron and steel works over 2,500 manufacturing establishments, employing more than 75,000 persons. The most important manufacture next to iron products is glass in many varieties. There are also large tanneries, and manufactories of steel cars, paper bags, carbon points, boots and shoes, white lead, etc. The lumber and pork-packing industries are very large.

Banks.—On Sept. 1, 1919, there were 22 National banks in operation, as well as many private banks and trust companies.

Education.—At the close of the school year 1919 there were over 80,000 children enrolled in the public day schools. There is also an excellent system of night schools, kindergartens, and manual training schools, and many private schools. The institutions for higher education include University of Pittsburgh, Western University of Pennsylvania, Duquesne University, Pittsburgh Academy, Pittsburgh Female College; School of Design for Women, Pennsylvania College for Women, Carnegie Institute of Technology, several theological seminaries, several commercial colleges, Bishop Bowman Institute, Ursuline Academy, Convent of the Sisters of Mercy, and county and city medical schools.

Churches and Charitable Institutions.—There are over 250 churches in Pittsburgh. The most important of these are St. Paul's Cathedral, Trinity (P. E.), St. Peter's (P. E.), First Presbyterian, United Evangelical (German), First Baptist, English Evangelical, etc. Among the charitable institutions are the Western Pennsylvania, City General, the Homeopathic, the Mercy, St. Francis, Passavant's, St. Margaret Memorial, and East End Charity Hospitals; Roman Catholic Orphan Asylum, Convent of the Sisters of Mercy, Western State Institu-

tion for the Deaf, Dumb, and Blind, Home for Incurables, etc.

Finances.—In 1919 the total bonded debt of the city was $35,199,093, less sinking fund. The assessed valuation in 1919 was real estate $806,020,730, and tax rate $1.33 per hundred.

History.—In 1754, at the suggestion of George Washington the English began to erect a blockhouse on the present site of the city. They were, however, driven away by the French, who built a fort at the junction of the two rivers and named it Du Quesne. In 1758, after two unsuccessful attempts to retake the place, the English under General Forbes made a third attempt, and the French burned and evacuated the fort. In the following year another fort was erected here, named in honor of William Pitt. Shortly after a village was established by some English and Scotch settlers. The British withdrew from the post in 1772, and it was held by Virginia in 1775–1779. The place was incorporated as a city March 18, 1816.

PITTSBURGH, UNIVERSITY OF, a non-sectarian educational institution, founded in 1819 as the Western University of Pennsylvania, under which name it was known until 1908. The enrollment of students in 1919 was 4,191, and the faculty numbered 461. The productive funds in 1919 were $570,000 and the income amounted to $700,000. The library contained about 35,000 volumes. The chancellor was Samuel Black McCormick, D.D., LL.D.

PITTSFIELD, a city and county-seat of Berkshire co., Mass.; on the Housatonic river, and on the New York, New Haven and Hartford and the Boston and Albany railroads; 52 miles W. of Springfield. The city comprises about a dozen villages. Here are a high school, private schools, the Berkshire Athenæum with art gallery and public library, House of Mercy Hospital, Berkshire County Home for Aged Women, Bishop Memorial Training School for Nurses, Berkshire Agricultural Society, churches, public schools, street railroads, electric lights, National and savings banks, and several daily and weekly newspapers. The city has manufactories of cotton and woolen goods, silk, knit goods, shirts, shoes, pianos, paper making machinery, overalls, paper, machinery, brick, electric machinery, shuttles and bobbins, and brass castings. Pop. (1910) 32,121; (1920) 41,534.

PITTSTON, a city in Luzerne co., Pa., on the Susquehanna river, and on the Lehigh Valley, the Lackawanna and Wyoming Valley, the Lackawanna and other railroads; 9 miles S. W. of Scranton. Here are waterworks, gas and electric lights, several banks, and a number of daily and weekly newspapers. It is chiefly a mining town, though there are several manufacturing industries, including a knitting mill, a silk mill, foundries and stove, car-wheel, engine, and iron roofing works. The city was settled about 1770, was incorporated as a borough in 1853, and became a city of the third class in 1894. Pittston has an assessed property valuation of nearly $1,500,000. Pop. (1910) 16,267; (1920) 18,497.

PITUITARY BODY, a small reddish-gray mass divided into an anterior and a posterior lobe, and occupying the *sella turcica* of the sphenoid bone. Formerly called the pituitary gland, from the erroneous belief that it discharged mucus into the nostrils.

PIT VILLAGES, collections of earth caves dug in the ground and covered with stones, wooden or wattle lids, or clay or sods of turf. They were used by prehistoric races or by races at the lowest stages of barbarism. The pits are oval or pear-shaped, varying between 22 and 42 feet in length and from five feet high.

PIURA, a department of Peru with an area of 14,834 square miles. While the eastern part is mountainous with valleys of considerable fertility, the western portion is chiefly desert land. Cotton is grown to some extent and minerals are found. The capital is the city of the same name. Pop., department, about 200,000; city, about 15,000.

PIUS, the name of a number of Popes, as follows:

PIUS I., succeeded Hyginus in 142, and died in 157.

PIUS II. (Æneas Sylvani Piccolomini); born in Tuscany in 1405, of an ancient and illustrious family. In 1431 he assisted at the Council of Basel as secretary; was afterward secretary to the anti-Pope Felix V., and then to the Emperor Frederick III. Eugenius IV. chose him for apostolic secretary, Nicholas V. made him a bishop, and sent him as nuncio to Bohemia, Moravia and Silesia and Calixtus III. created him cardinal. Pius had by this time become a zealous supporter of the power of the Pope. He was one of the most learned men of his time and distinguished himself by moderation and a conciliatory spirit. He was chosen to succeed Calixtus III. in 1458, and in the following year assembled a congress at Mantua for the purpose of arranging a crusade against the Turks. He soon after published a bull against appeals to a council, which

occasioned some dispute with Louis XI. In 1463, by another bull, he retracted his former sentiments respecting the Council of Basel, condemning his defense of it. Among the writings of Pius II. are a "History of the Council of Basel"; "History of Frederick III."; "History of Bohemia"; "Cosmographia," etc. He died in Ancona, August, 1464.

PIUS III. (Francesco Piccolomini), nephew of the preceding pontiff. He was elected Pope in 1503, but died in less than a month afterward.

PIUS IV. (Cardinal de Medici); born in Milan, in 1499. He rose by merit to several high employments, and, in 1549, obtained the cardinalship, and, on the death of Paul IV., in 1559, was elected Pope. He confirmed the decrees of the Council of Trent, after the closing of that assembly in 1564. In the following year a conspiracy was formed against his life by Benedict Accolti and others, who were executed. This Pope was not of the celebrated Medici family of Florence. He died in 1565.

PIUS V. (Michele Ghislieri); born in Redmont in 1504, and early entered the Dominican order. He so distinguished himself by his austere life, and his zeal against heretics, that he was appointed inquisitor in Lombardy, and afterward inquisitor-general. He was created cardinal in 1557, and was chosen to succeed Pius IV. in 1566. He set himself to effect reforms, both in morals and discipline, excited terror in Italy by the seizure, imprisonment, and burning of those convicted or suspected of heresy, expelled the Jews from the States of the Church, excepting only the cities of Rome and Ancona. The great victory over the Turks at Lepanto was the result in good part of the efforts of Pius V. Died 1572.

PIUS VI. (Giovanni Angelo Braschi); born in Cesena, in 1717, and succeeded Clement XIV. in 1775. His first act was to make a reform in the public treasury; he then completed the museum in the Vatican; but the greatest work of his pontificate was the draining of the Pontine marshes. When the Emperor Joseph II. decreed that all the religious orders in his dominions were free from papal jurisdiction, Pius went in person to Vienna in 1782, but his remonstrances were ineffectual. The French Revolution, however, was of more serious consequence to the Papal See. The Pope having favored the allies, Bonaparte entered the ecclesiastical territory, and compelled him to purchase a peace by a contribution of several millions, and delivering up the finest works of painting and sculpture. Basserville was then sent as envoy from the republic to Rome, where he behaved with so much insolence, that the people assassinated him in 1793. General Duphot entered the city with his troops to restore order, but the papal soldiers routed them, and Duphot was slain. On this Bonaparte again entered Italy, and made the Pope prisoner in the capitol, which was plundered. The venerable pontiff was carried away by the victors, and hurried over the Alps to Valence, where he died Aug. 29, 1799.

PIUS VII. (Gregorio Barnaba Chiaramonti); born in Cesena, in 1742; became a Benedictine monk; was created cardinal in 1785, and after the death of Pius VI. was chosen to succeed him, March, 1800. In 1804 the Pope went to Paris and crowned Napoleon emperor, returning to Rome in May, 1805. Soon after Ancona was seized by the French, and the great quarrel between Napoleon and the Pope began. The occupation of the castle of San Angelo in 1808 was followed by the annexation of the States of the Church to the French empire. Pius was arrested by the French officer Miollis and sent to Savona, and afterward to Fontainebleau, whence he was not permitted to return to Italy till January, 1814. The Congress of Vienna restored the States of the Church to the Pope, who applied himself thenceforth to internal reforms. He, however, reestablished the Jesuits and the inquisition. The character of Pius VII. was such as to win him the esteem and sympathy of men of all Churches and sects. He died Aug. 20, 1823.

PIUS VIII. (Cardinal Castiglione), became Pope in succession to Leo XII., in 1829. After a short pontificate of one year, he died in 1830.

PIUS IX. (Giovanni Mario Mastai Ferretti); born in Sinigaglia, May 13, 1792; was intended for the army, but resolved to devote himself to the Church. For several years attended to pastoral duties and was nominated by Pius VII. on a mission to the government of Chile. On his return to Rome he was appointed by Leo XII. to one of the most important of the ecclesiastico-civil departments of administration. In 1836 he was sent as apostolic nuncio to Naples, while the cholera was raging there, and his name is still revered by the poorer inhabitants of that city, in gratitude for his disinterested efforts to alleviate their sufferings. In 1840 he was created Cardinal-Archbishop of Imola, in the Romagna, where much political disaffection existed; He ruled this diocese with so much zeal and self-denial, and displayed such liberality of sentiment, that he soon gained the affections of the people, and restored peace and tranquility to the district. Pope Gregory XVI. died June 1, 1846,

and Cardinal Ferretti was elected to the papacy under the name of Pius IX., June 16. The new Pope at first acquired much popularity by favoring the hopes and wishes of the people for the reform of the abuses of the government. But the French Revolution of 1848 gave a much more powerful impulse to the enthusiasm, not only of the Italian patriots, but of the friends of liberal institutions all over Europe. These sweeping changes the Pope was not prepared to support, and from that moment his popularity began to decline. The popular disaffection was greatly increased on his taking for his minister Count Rossi, one of the most aristocratic and unpopular men in Rome. Count Rossi was assassinated Nov. 15, and Pius himself, a few days later, escaped from Rome in disguise, and arrived safely in Gaëta in the Neapolitan territory. He sent to Rome an ordonnance, Nov. 27, declaring void all the acts of the government, which he superseded by a state commission. This document the Roman chambers treated with contempt, appointed a provisional government, and set about improving the victory they had achieved. The Pope remained nearly a year and a half at Gaëta and Portici, an object of sympathy as the head of the Roman Catholic Church. During his absence, Rome, which was in the possession of the native troops under Garibaldi, was besieged, and at last taken by storm by the French army under General Oudinot. The Pope left Portici, April 4, 1850, escorted by Neapolitan and French dragoons, accompanied by the king of Naples, and re-entered Rome April 12, amid the thunder of French cannon. His chief ecclesiastical acts are the formal definition of the dogma of the Immaculate Conception, in December, 1854; the famous encyclical of December, 1844, which was provoked by the Franco-Italian convention, providing for the withdrawal of the French troops from Rome—an act which was, however, practically annulled by the return of the French forces in 1867, in consequence of an attempt at invasion by Garibaldi; and the bull summoning the Ecumenical Council of 1869–1870, which promulgated the doctrine of papal infallibility. In September, 1870, the French troops were withdrawn from Rome, and in October the States of the Church were annexed to the kingdom of Italy, thus ending the temporal power of the Popes. He died Feb. 7, 1878.

Pius X. Cardinal Giussepe Sarto, Patriarch of Venice, was chosen by the Papal Conclave to succeed Leo XIII., Aug. 4, 1903. The election was universally approved, and on Aug. 9, the Patriarch was crowned at St. Peter's assuming the title Pius X. He was born in Italy in 1835, of peasant family. Priest, 1858; bishop, 1866; cardinal, 1893. In 1907 in his encyclical he inveighed against "modernism." He raised a great sum of money for the victims of the

POPE PIUS X.

earthquake in that year. In 1910 he issued a decree debarring the clergy from engaging in the administration of social organizations. He died in 1914.

PIZARRO, FRANCISCO, a Spanish explorer, the conqueror of Peru; the illegitimate son of a gentleman of Truxilla, being left entirely dependent on his mother, a peasant girl, he received no education. He embarked in 1510, with some other adventurers, for America; and, in 1524, after having distinguished himself under Nuñez de Balboa on many occasions, he associated at Panama with Diego de Almagro and Hernandez Luque, a priest, in an enterprise to make fresh discoveries. In this voyage they reached the coast of Peru, but being too few to make any attempt at a settlement, Pizarro returned to Spain, where all that he gained was power from the court to prosecute his object. However, having raised some money, he was enabled again, in 1531, to visit Peru, where a civil war was then raging between Huascar, the legitimate monarch, and

his half-brother, Atahualpa, or Atabalipa, as he is variously called, the reigning inca. Pizarro, by pretending to take the part of the latter, was permitted to march into the interior, where he made the unsuspecting king his prisoner, while partaking of a friendly banquet to which he had invited him and his whole court; then extorting from him, as it is said, a house full of the precious metals by way of ransom, he had him tried for a pretended conspiracy, and condemned him to be burned, allowing him first to be strangled, as a reward for becoming a Christian. In 1533 the conqueror laid the foundation of Lima;

FRANCISCO PIZARRO

but, in 1537, a contest arose between him and Almagro, who was defeated and executed. Pizarro was murdered by Almagro's followers, June 26, 1541.

PIZARRO, GONZALO, half brother of the preceding; born in 1502. His brother appointed him governor of Quito in 1540, and after the assassination of Francisco, he raised an army against the new viceroy, Blasco Nuñez, and the latter was defeated and slain near Quito in 1546. But Pizarro did not long enjoy his success, being beaten, taken prisoner, and beheaded in 1548.

PLACENTA, in anatomy, the organ by which the fœtus is connected with the mother, and vascular connection between the two maintained. It ultimately comes away as the afterbirth. Called also uterine cake. In botany, the part of the ovary from which the ovules arise. It generally occupies the whole or a portion of an angle of each cell. When elongated so as to constitute a little cord it is called the umbilical cord.

PLACOID, a term used to designate a variety of scales covering the bodies of the elasmobranchiate fishes (sharks, skates, rays, etc.), the *Placoidei* of Agassiz. These structures consist of detached bony grains, tubercles, or plates, of which the latter are not uncommonly armed with spines.

PLAGUE, a peculiarly malignant fever of the continued and contagious type, now believed to be almost identical with the worst kinds of typhus fever. It is produced by the absorption of a poison generated by decaying animal matter combined with heat, moisture, and bad ventilation. At first there is great restlessness, followed ultimately by corresponding exhaustion, and death supervenes in two or three days. Grand Cairo is the chief known focus of the plague, the spread of which, in different directions, is at least attempted to be checked by quarantine. The plague seems to have been the black death of the 14th century. It was known by the name of plague when, in 1665, it slew in London 68,596 people, about one-third of the population.

In the summer of 1896 a very malignant form of disease, known as the "bubonic" plague, made its appearance in Bombay, India, and spread with great rapidity. The number of cases and deaths finally became so large that more than 450,000 people—one-half of the population, fled from the city. The bubonic plague receives its name from the fact that it attacks the lymphatic glands in the neck, armpits, groin, and other parts of the body. In general, the disease is spread in the same manner as cholera, except that the cholera germ must enter the intestinal tract, while the germ of the plague may attack any part of the mucous membrane, or be attended by even the minutest abrasion of the skin. But while this germ is so virile and so easily taken into the system, it is one of the most easily killed by disinfection. One per cent. of quicklime will destroy it.

The Ten Plagues of Egypt were 10 inflictions divinely sent upon the Egyptians to compel them to emancipate the Israelites from bondage and allow them to quit the land. (Exod. vii: 14, xii: 30. For the use of the word plague see ix: 14, xi: 1.)

PLAICE, *Pleuronectes platessa*, a fish well known in northern Europe. It

ranges from the coast of France to Iceland, frequenting sandy banks, sometimes met with on mud banks. It is not in great repute as a food fish, as its flesh is soft and watery.

PLAID, goods of any quality or material of a tartan or checked pattern. Also, a garment of tartan or checked woolen cloth of various colors, worn by both sexes of the natives of Scotland, of which country it is an important part of the national costume.

PLAIN, an expanse of low-lying territory as distinguished from a table-land or plateau. Speaking broadly, the Western Hemisphere is the region of plains, and the Eastern of table-lands. Also, a nickname for the level floor of the hall in which the first French National Convention was held in 1792. By metonomy it was applied also to the Girondist party whose seats were there.

PLAINFIELD, a town of Connecticut in Windham co. It includes several villages. It is on the Quinebaug and Moosup rivers and on the New York, New Haven and Hartford railroad. In the town are public libraries, and in the village is the Plainfield Academy, one of the oldest institutions of the kind in New England. There are cotton and woolen mills and yarn factories, foundries and other industries. Pop. (1910) 6,719; (1920) 7,926.

PLAINFIELD, a city in Union co., N. J., on the Central of New Jersey railroad; 24 miles W. of New York. It is a suburban place of residence for New York business men. It contains private schools, public library, Muhlenberg Hospital, street railroad and electric light plants, banks, and weekly newspapers. It has manufactories of hats, clothing, silk and cotton goods, machinery, printing presses, etc. Pop. (1910) 20,550; (1920) 27,700.

PLAIN SONG, *Cantus planus*, the most ancient and simple form of church music, consisting of easy progressions in one of the church modes, suitable for use by priests or a congregation; it is opposed to *cantus figuratus*, or figurate song, containing more ornate progressions of a later period. When counterpoint was introduced, it was customary to compose parts above or below a portion of ancient plain song, hence, the term plain song is often synonymous with *Canto fermo*, or the fixed melody to which counterpoint is added. The term as used in these days includes roughly, ancient chants, inflections, and melodies of the church. Called also plain chant and sometimes plain singing. Also the simple, plain notes of an air without ornament or variation.

PLAINTIFF, one who enters or lodges a complaint in a court of law; one who commences a suit in law against another; opposed to defendant.

PLAN, properly a map, representation, or delineation of a building, machine, etc., on a plane surface. More exactly, the plan of a building is a horizontal section supposed to be taken on the level of the floor through the solid walls, columns, etc., so as to show their various thicknesses and situations, the dimensions of the several spaces or rooms, the position of the doors, etc. The term is also commonly extended to a map or representation of a projected or finished work on a plane surface; as, the plan of a town, of a harbor, etc.

PLANARIDA, a sub-order of *Turbellaria*, flat, soft-bodied, hermaphrodite animals, of ovoid or elliptic form; their integument with vibratile cilia and cells; the former used in locomotion. They have a proboscis, and two pigment spots serving for eyes.

PLANCHETTE, a piece of board generally heart-shaped, mounted on thin supports, two of which are casters, and one a pencil which makes marks as the board is pushed under the hands of the person or persons whose fingers rest upon it. The exact cause of its motions is not clearly understood.

PLANÇON, POL, a French basso, born in 1854 in the Ardennes and at the wish of his parents entered business in Paris. By means of a friend he was able to study music at the Ecole Duprey and made his début in Grand Opera at Lyons. In 1883 he appeared as Mephisto in "Faust" and his success in this rôle and in that of Ramfis in "Aïda" made him world renowned. From 1893 to 1904 he was a member of the Metropolitan Opera House in New York. He died in Paris in 1914.

PLANE, in joinery, a carpenter's cutting and surface smoothing tool, of which there are many varieties, named from some peculiarity of construction or purpose.

In geometry, a surface such that, if any two points be taken at pleasure and joined by a straight line, that line will lie wholly in the surface. A plane is supposed to extend indefinitely in all directions, the term is also frequently used, especially in astronomy, to denote an ideal surface supposed to cut or pass through a solid body, or in various directions; as, the plane of the ecliptic, the plane of a planet's orbit.

PLANE TREE, any species of the genus *Platanus* of which five or six exist. They are tall trees with ponderous trunks, the bark of which peels off annually, leaving the surface smooth and bare. The Oriental plane tree, *P. orientalis*, an umbrageous tree, 70 to 90 feet high, has palmate leaves like those of the sycamore. It is a native of western Asia and Cashmere. Its smooth-grained wood is used in the East for cabinet making. In India its bruised leaves are applied to the eyes in ophthalmia, and its bark, boiled in vinegar, given in diarrhœa. The Occidental or American plane tree, *P. occidentalis*, has less deeply divided and indented leaves, and no membranous bracts along the female flowers. On the banks of the Ohio and the Mississippi there are trees 10 to 16 feet in diameter. Called, also, in the United States, buttonwood and water beech, and sycamore, and in Canada, cotton tree. A third species, often confounded with this one, is the maple-leaved plane, *P. acerifolia*, the species sometimes with giant trunk, cultivated in some London squares. The Scotch or mock plane tree is *Acer pseudo-platanus*.

PLANET, a heavenly body which, to old-world observers, seemed to wander about aimlessly in the sky, thus markedly contrasting with the orderly movements of the fixed stars. Subsequently it was discovered that the seemingly erratic bodies were as regular in their movements as the others, revolving, like the earth, around the sun. Planets are primary or secondary, the former revolving around the sun, the latter around the primaries. The primary planets known to the ancients were five: Mercury, Venus, Mars, Jupiter, and Saturn. Omitting asteroids, comets, and meteoric rings, eight are now known. Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Twenty-one secondary planets are known, the Moon, two satellites of Mars, five of Jupiter, eight of Saturn, four of Uranus, and one of Neptune. The planets Mercury and Venus, being nearer than the Earth to the Sun, are called inferior planets; the others, being more distant, are termed superior. Another classification is sometimes adopted, that into intra- and extra-asteroidal planets; that is, those nearer and those more remote from the sun than the asteroids. Under the first are included, Mercury, Venus, the Earth, and Mars, all of which are comparatively small, while the others, Jupiter, Saturn, Uranus, and Neptune, are the giants of the system. For instance, the Earth is 7,918 miles in diameter, and Mars 4,200, but Jupiter is 85,000. The intra-asteroidal planets complete the annual revolution in short periods, the Earth, for example, in 365.26 days, while Neptune takes to do so 60,127 days, or about 165 years. The minor planets, planetoids, or asteroids are between Mars and Jupiter.

PLANETOIDS, the name given to a great group of minute planets placed together between Mars and Jupiter. Professor Titius, of Wittenberg, having drawn attention in 1772 to the fact that, with the exception of Jupiter, each planet has an orbit just about double that nearest to it on the side of the sun, Professor Bode, of Berlin, drew the natural inference that the one exception to the rule would probably be removed by the discovery of a planet less remote from the sun than Jupiter, and more distant than Mars. On Jan. 1, 1801, a planetary body, afterward called Ceres, was found by Piazzi in the part of the solar system theoretically indicated; it was, however, far more diminutive in size than had been expected. Within the next six years three more asteroids (Pallas, Juno, and Vesta) were found in proximity to Ceres. Up to October, 1903, 542 small planets had been discovered, 70 by Americans. All are of minute size, and some angular in place of spherical.

The term asteroid, applied to these small bodies, is now becoming obsolete, the appellation minor planets taking its place. They are sometimes also called extra-zodiacal planets, from their orbits stretching outside the zodiac, which is not the case with those of the normal type. Authorities differ respecting some minute points in the list of asteroids. Melete, when discovered on Sept. 9, 1857, was mistaken for Daphne, an error not detected till January, 1859. Herschel, Proctor, etc., number it 56, and place the date 1857, where it offends the eye, in 1859; others, with Mr. G. F. Chambers, transfer it to 1857, which alters the numbering of all the minor planets from 47 to 56. There are other minute differences between lists of asteroids by leading authorities.

PLANT BREEDING, the science of producing new or improved species of plants by a process of crossing or selection. The tendency of all plants is to reproduce plants possessing all their own characteristics, but changes and improvements are brought about by various methods.

The simplest method of the selection process is to save the seeds of only those plants which possess in a marked degree the desired characteristics. This process is usually slow and uncertain,

and fertilization through a natural or artificial transfer of pollen is often resorted to. Improvement to various grains, sugar beets, potatoes, etc., has been accomplished by emasculating selected specimens. When the stigma of these are ripe, pollen from other selected plants is applied, and the plants are kept under a gauze hood to prevent accidental contact with other pollen. The seeds of these specially treated specimens are collected, and used for future breeding. Artificial asexual methods, of which grafting is the most common, are the simplest form of plant breeding, and though perhaps the surest of the methods, are not likely to produce the strongest plants. A large number of experiments must be made, and a great amount of tedious work done before a new type is produced that can be introduced commercially. Not all the specimens are improvements, for plants are just as likely to degenerate under the process as they are to improve.

These simple rules are used by many of the leading plant breeders:

Well developed seedlings produce the best plants; small leaves usually mean undersized fruit; pale leaves mean pale fruit; great productiveness does not go with earliness.

PLANT, MORTON F., an American financier. He was born in New Haven, Conn., in 1852, and when 16 went as clerk with an express company at Memphis, Tenn., later finding a position in railroad work. From 1884 he was connected with the Plant System of railroads, becoming vice-president. He cooperated in its merging with the Atlantic Coast Line of which he became a director, as likewise of the Chicago, Indianapolis, and Louisiana Railway. Apart from his railroad interests, he was prominent in banking affairs, and owned several yachts, in which sport he found relaxation. He died in 1918.

PLANTAGENETS, the surname of a line of English kings, who were of French origin on the paternal side—HENRY II. of England, the first of the line, having been the son of Geoffrey V., Duke of Anjou, and of Matilda, daughter of Henry I. The Duke of Anjou was so named because he usually wore a sprig of broom—in Latin *planta genista*, in French *plante genêt*—in his cap. Henry II. ascended the English throne in 1154, and his descendants reigned during 331 years, the last monarch of the line being RICHARD III., who fell at the battle of Bosworth, in 1485. In the 14th century the line became divided into two great rival factions, that of York and of Lancaster, known as the parties of the Red and White Rose.

PLANTAGINACEÆ, or PLATAGINEÆ, ribworts; an order of perigynous exogens, alliance Cortusales. Herbaceous plants with or without a stem. Leaves flat and ribbed or taper and fleshy. Flowers in spikes, solitary. Distribution world-wide: known genera three, species over 200.

PLANTAGO, plantain or ribgrass; the typical genus of the order *Plantaginaceæ;* herbs, with bisexual flowers. Mucilaginous and astringent. Known species about 48. In India the leaves of *P. major* are applied to bruises. *P. coronopus* is diuretic. Demulcent drinks can be made from *P. psyllium, P. arenaria,* and *P. cynops.* The seeds of *P. psyllium* and *P. ispaghula,* treated with hot water, yield a mucilage given in India in diarrhœa, dysentery, catarrh, gonorrhœa, and nephritic diseases. *P. amplexicaulis* is used in India in phthisis, snake poison, intermittent fever, and as an external application in ophthalmia. Soda is obtained in Egypt from *P. squarrosa.*

PLANTAIN, the *Musa paradisiaca,* a small tree closely akin to the banana from which it differs in not having purple spots on its stem. The fruit also is larger and more angular. It is extensively cultivated throughout India, where its leaf is used for dressing blistered wounds and as a rest for the eye in ophthalmia. Powdered and dried, it is used to stop bleeding at the nose. The fruit is delicious and thoroughly wholesome. When unripe it is cooling and astringent, and very useful in diabetes. The root is anthelmintic, and the sap is given to allay thirst in cholera.

PLANTAIN EATERS, *Musophagidæ,* a family of birds, of African distribution, arboreal habits, and vegetarian diet. The species of Musophaga are bluish black, the Turacous (Turacus) are light green with carmine wing-feathers. This occurrence of a green pigment, as distinguished from a green color, is unique among birds, and the carmine pigment is also interesting because it seems to be partially washed out during the rainy season.

PLANTATION, a term formerly used to designate a colony. The term was latterly applied to an estate or tract of land in the Southern States, the West Indies, etc., cultivated chiefly by negroes or other non-European laborers. In the Southern States the term planter is specially applied to a person who grows cotton, sugar, rice, or tobacco.

PLANTIGRADA, in zoölogy, a section of the Carnivora, embracing those which apply the whole or nearly the whole of the sole of the foot to the ground in progressive motion. Example, the bears, the badgers.

PLASENCIA, a town of Spain, in Estremadura, 130 miles W. by S. of Madrid and 43 N. E. of Caceres, surrounded with double walls (1197), has a fine Gothic cathedral (1498). The monastery of San Yuste, to which Charles V. retired after his abdication, lies 24 miles to the E. of Plasencia.

PLASMA, the viscous material of a cell from which the new developments take place; formless, elementary matter.

PLASMA, a bright to leek-green variety of chalcedony, sometimes almost emerald-green; feebly translucent; luster, somewhat oily; fracture, sub-vitreous, probably due to a small amount of opal-silica present. It is rather rare, and was much esteemed by the ancients for engraving on.

PLASSEY, a battlefield on the Bhágirathi river, 96 miles N. of Calcutta. The river has now eaten away the scene of the struggle. Plassey is celebrated in the history of India for the great victory gained by Clive over Suraj ud Dowlah, subahdar of Bengal, June 23, 1757, a victory which really laid the foundation of British supremacy in India.

PLASTER, calcined gypsum or sulphate of lime, used, when mixed with water, for finishing walls, for molds, ornaments, casts, luting, cement, etc. Also a composition of lime, sand, and water, with or without hair as a bond, and used to cover walls and ceilings. In pharmacy, an unctuous compound, united either to a powder or some metallic oxide, and spread on linen, silk, or leather, for convenience of external application.

PLASTERING, the art of covering the surface of masonry or wood work with a plastic material in order to give it a smooth and uniform surface, and generally in interiors to fit them for painting or decoration.

PLASTER OF PARIS, the name given to gypsum when ground and used for taking casts, etc.

PLATA, RIO DE LA, River of Silver; a body of water which extends for more than 200 miles between the Argentine Republic and Uruguay, and is not, strictly speaking, a river, but rather an estuary, formed by the junction of the great rivers Paraná and Uruguay. It flows into the Atlantic between Cape St. Antonio and Cape St. Mary, and has here a width of 170 miles. On its banks are the cities and ports of Montevideo and Buenos Ayres. It was discovered in 1515 by Juan Diaz de Solis, and called Rio de Solis; it owes its present name to the famous navigator Cabot.

PLATÆA, a city in the W. part of Bœotia, on the borders of Attica, and at the foot of Mount Cithæron, 6 miles from Thebes. In 480 B. C. it was destroyed by the Persians, because the inhabitants had taken part with Athens in the battle of Marathon; but in the following year it was the scene of the glorious victory won by the Lacedæmonian Greeks, under Pausanias and Aristides, over the Persian hordes commanded by Mardonius. In the third year of the Peloponnesian war (429) it was attacked by a Theban-Lacedæmonian force, and heroically defended itself for more than two years, when the little garrison of about 200 men were put to the sword, and the city demolished. Some Platæans escaped to Athens and by the treaty of Antalcidas (387) their descendants were allowed to return and rebuild their city. They were driven forth again by the Thebans, and half a century passed before Philip of Macedon's victory at Chæronea enabled the Platæans to return home where they remained until the 6th century A. D.

PLATINUM, in chemistry, symbol, Pt.; at. wt., 194.3; sp. gr.= 21.6, a tetrad metallic element discovered first in the United States; and still produced there; also found in the Ural chain, and in copper ore from the Alps. Pure forged platinum takes a high luster, is nearly as white as silver, and very ductile and malleable. It resists the strongest heat of the forge fire, but can be fused by the electric current; is the heaviest known substance excepting osmium and iridium, is unalterable in the air, dissolves slowly in nitromuriatic acid, but is not attacked by any single acid. It is used extensively in the manufacture of expensive jewelry, and delicate instruments. During and after the World War (1914-1918) it ranged in value from $120 to $150 per ounce.

PLATO, a Greek philosopher; born in Athens, or in Ægina, in May, 429 B. C. He was son of Ariston and Perictione, and was named Aristocles. The name Plato was afterward applied to him in allusion to his broad brow, broad chest, or fluent speech. Endowed with an imaginative and emotional nature, he early began to write poems, and studied philosophy, and at 20 became the disciple of Socrates. He burnt his poems, remained

devotedly attached to Socrates for 10 years. After the death of Socrates, he went to Megara, to hear Euclid; thence to Cyrene, and perhaps to Egypt and S. Italy. On his return he began to teach gratuitously at Athens, in the plane tree grove of the Academia; and had a great number of disciples. Among them was Aristotle, distinguished as the "Mind of the School," and perhaps Demosthenes. Women are said to have attended. In his 40th year, Plato visited Sicily, but he offended the tyrant Dionysius by the political opinions he uttered, and only escaped death through the influence of his friend, Dion.

PLATO

Plato never married, took no active part in public affairs, lived absorbed in the pursuit of truth. His works have come down to us complete, and are chiefly in the form of dialogues. They are singular in their union of the philosophic and poetic spirit—the depth of the philosopher and the rigorous exactitude of the logician with the highest splendor of imagination of the poet. We owe to him the threefold division of philosophy into dialectics, physics, and ethics; the first sketch of the laws of thought; the doctrine of "ideas," as the eternal archetypes of all visible things; and the first attempt toward a demonstration of the immortality of the soul.

It is difficult to say what idea Plato had of the Deity. It seems, however, that his idea of the good and Him were identical. Plato distinguishes two components of the soul—the divine or rational, that which partakes of a divine principle, and participates in the knowledge of the eternal; and the mortal or irrational, that which participates in the motions and changes of the body, and is perishable. The two are united by an intermediate link, which he calls *thumos*, or spirit. He believes in future retribution; exonerates God from responsibility for sin and suffering, and sets forth in elaborate myths the blessedness of the virtuous and the punishments of the vicious. His birthday was long observed as a festival. He died in the act of writing, it is said, in May, 347 B. C.

For biography see Adams' "Religious Teachers of Greece" (1909) and for doctrine Fowler's "Loeb's Classical Library" (1913).

PLATT, THOMAS COLLIER, an American legislator; born in Owego, N. Y., July 15, 1833; prepared for college at Owego Academy; entered Yale College 1853, but ill-health forced him to leave. Engaged in mercantile life; was president of the Tioga National bank at its organization; interested in the lumbering business in Michigan; was county clerk of the county of Tioga in 1859, 1860 and 1861; was elected to the 43d and 44th Congresses; was elected United States Senator Jan. 18, 1881, and resigned that office May 16 of the same year, with Roscoe Conkling, both Senators being offended because President Garfield made New York appointments without consulting them; was chosen secretary and director of the United States Express Co. in 1879, and in 1880 was elected president of the company; was member and president of the board of quarantine commissioners of New York from 1880 till 1888; was delegate to the National Republican conventions from 1876 to 1904 uninterruptedly; was president of the Southern Central railroad; a member of the National Republican committee; and United States Senator from 1896. He died March 6, 1910.

PLATTE (plăt), a river in the United States, which rises in the Rocky Mountains by two branches, called respectively the North and South Forks of the Platte. The united stream falls into the Missouri after a course of about 1,900 miles. It is from 1 mile to 3 miles broad, shallow, encumbered with islands, has a rapid current, and therefore not navigable.

PLATTSBURG, a town and county-seat of Clinton co., N. Y.; at the mouth of the Saranac river, which here enters Cumberland Bay, a part of Lake Champlain, and on the Delaware and Hudson, and the Chateaugay railroads; about 155 miles N. of Albany. Here are electric lights, public library, court house and jail, barracks for United States soldiers, custom house, Home for Aged Ladies, Home for the Friendless, Plattsburg Academy, a State Normal school, National banks, and a number of daily and weekly newspapers. The town has a large harbor, and ships lumber, grain, and other commodities. It has manufactures of shirts, wood pulp, sewing machines, etc. On Oct. 11, 1776, one of the earliest naval actions of the Revolutionary War took place here, Benedict Arnold commanding the American forces. On Sept. 11, 1814, Commodore McDonough gained a remarkable victory over the British fleet in Cumberland Bay. About the same time an American army under General Macomb repulsed a superior force which, under General Prevost, had attacked the town. Pop. (1910) 11,138; (1920) 10,909.

PLATTSBURG TRAINING CAMPS, United States military barracks, established in 1838 and having a reservation of over 700 acres on the W. side of Lake Champlain, S. of Plattsburg, N. Y., on the Delaware and Hudson railroad. The barracks are among the largest in the United States, and is usually garrisoned by a regiment of infantry. The reservation has often been used as a training camp in military exercises by business men from New York and the surrounding towns, and in 1915 a training camp was established there by the Government. During the campaign for preparedness that preceded the entry of the United States into the European War, exercises in drill were carried on at Plattsburg continually, and college and business men went in large numbers to submit themselves to training. After the entry of the United States into the war, the training camps were greatly extended, and recruits were there put through their drill in great numbers.

In 1915 the organizers of the camp at Plattsburg sought the co-operation of professional and business men from the south. The military encampments usually lasted a month, during which the men were instructed in military calisthenics, rifle practice, offensive and defensive field work, camp sanitation, trench digging, signalling, marching, and in the general duties of a soldier. Before the United States entered the war the number of men voluntarily attending ran up to about a thousand, and the cost of the instruction was about $60. The civic authorities co-operated and the policemen of New York who desired to attend camp were permitted to do so on full pay. General Wood inspected the camps of college students and addresses were delivered by Colonel Roosevelt and other public men. Among those who took the training were Mayor Mitchel and other New York City officials. The men so trained were encouraged to join the National Guard, and as a result of the work accomplished business men in Chicago and other cities had similar training camps established. On several occasions the trenches at Plattsburg were used in mimic battles.

PLAUEN, one of the most important manufacturing towns of Saxony; on the Elster, 72 miles S. of Leipsic. Its chief industries are the manufacture of cotton goods, muslin, cambric, jaconet, and embroidered fabrics, with in a secondary degree cigars, paper, machinery. Pop. about 130,000.

PLAUTUS, T. MACCIUS, a Roman comic poet; born in Umbria, probably about 255 B. C. He spent the greater part of his life at Rome, where at one time he is said to have been reduced to the necessity of grinding corn with a handmill for a baker. He began to write plays about 220, and gained immense popularity with his countrymen by his numerous comedies. Twenty of his comedies are still extant out of the 21 pronounced genuine by Varro. One hundred and thirty were current under his name. His plays were still acted in the reign of Domitian, and some of them have been imitated by modern dramatists. He died 184 B. C.

PLAYFAIR, SIR LYON, an English scientist; son of Dr. G. Playfair, inspector-general of hospitals in Bengal; born in Meerut, Bengal, May 21, 1819; educated at St. Andrews and Edinburgh Universities. He studied chemistry under Graham in Glasgow and London, and under Liebig at Giessen. Inspector-general of government museums and schools of science in 1856, and was Professor of Chemistry at Edinburgh University 1858–1869. From 1868–1885 he represented Edinburgh and St. Andrews Universities in the House of Commons, and afterward the S. division of Leeds. He held several appointments under Liberal governments, including that of postmaster-general 1873–1874, and was created a K. C. B. in 1883. Besides his scientific memoirs he published numerous important papers on political, social, and educational subjects. Most of these

economical essays were collected and published under the title "Subjects of Social Welfare." He was also an LL.D. of Edinburgh (1869), F. R. S., member of many learned societies, and possessed several foreign orders. He died May 29, 1898.

PLAYGROUNDS AND RECREATION CENTERS. The first two decades of the twentieth century witnessed an increased interest in the welfare of children on the part of the American public. Legislation prohibiting child labor and restricting the hours of labor for young persons between the ages of 15 and 20 has been passed by the Federal Government and by nearly all the States. Educators have pointed out that in play all the child's energies and talents are given scope, because only in play can his deepest interest be aroused. Some intensity of interest and attention can be secured in work, but nothing in comparison with what can be obtained by play when that play is properly directed.

The city of Boston established the first playground in 1882, and New York, five years later appropriated $1,000,000 to be used in purchasing small parks to be used as playgrounds. In 1894 the Tenement House Commission secured two small plots from the city of New York to be used as playgrounds for the children of the tenements. One of these parks, left without any apparatus and with no directors, was of little use. The other, however, was directed by the Recreation League of New York, who raised funds to supply apparatus and to pay for the proper direction of the play. This was opened to the children in July 1899, under the name of Seward Park and at once proved an immense success. In the same year the school boards of the different boroughs comprising the city of New York appropriated money to equip the school-yards of the city with apparatus and to pay the directors of the play. From 1900 on, the number of playgrounds in New York have steadily increased, but not sufficiently to answer the requirements of the children. The success attending the experiment in New York led other large cities, both American and European to establish playgrounds. In 1920 nearly all cities in the United States having a population of over 50,000 had made some provision for playgrounds and for the most part they have had paid supervision. In 1907 the Playground and Recreation Society of America was founded and began to publish a monthy magazine, "The Playground."

The ownership and management of the playgrounds was at first entirely private but lately it has tended to take its place among those functions expected of a modern municipality. The chief agency in such cases of public ownership has been the school board. Very few playgrounds have been a success unless they have been under the supervision of some older person skilled in the direction of children. To meet this demand for trained leadership classes have been opened in many cities.

Many large cities finding the space provided for playgrounds insufficient have set aside certain streets for children's play. Traffic on these streets is prohibited during the hours from three in the afternoon until six at night. Chicago has made perhaps the most elaborate provision for playgrounds and recreation centers of any American city.

PLEA, in English law, that which is pleaded or alleged by a party to an action in support of his demand; in a more restricted sense the answer of the defendant in a cause to the plaintiff's declaration and demand. Pleas are two sorts: dilatory pleas, and pleas to the action. Pleas to the action are such as dispute the very cause of suit.

PLEADING, the act of advocating a cause in a court of law. In the plural, the written statements of parties in a suit at law, containing the declaration and claim of the plaintiff, or the answer or defense of the defendant. Pleadings consist of the declaration, the plea, the replication, the rejoinder, the sur-rejoinder, the rebutter, the sur-rebutter, etc., which are successively filed. Pleadings were formerly made by word of mouth in court.

PLEBEIANS, or PLEBS, in ancient Rome, one of the great orders of the Roman people, at first excluded from nearly all the rights of citizenship. The whole government of the state, with the enjoyment of all its offices, belonged exclusively to the patricians, with whom the plebeians could not even intermarry. The Lex Hortensia (286 B. C) gave the *plebiscita*, or enactments passed at the plebeian assemblies, the force of law. From this time the privileges of the two classes may be said to have been equal.

PLEDGE, the transfer of a chattel from a debtor to a creditor as a security of a debt, or that which is pledged or pawned as security for the repayment of money borrowed, or for the performance of some obligation or engagement; a pawn. Pledges are generally goods and chattels, but anything valuable of a personal nature, as money, negotiable

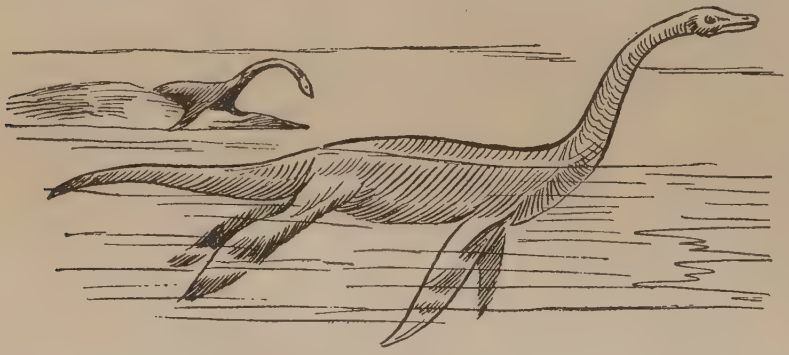
instruments, etc., may be given in pledge. A living pledge (*vadium vivum*) is one which produces an income, interest, or profit by being used, and which is retained by the pledgee till he shall have satisfied his claim out of such income, profit, or interest; a dead pledge (*vadium mortuum*) is a mortgage.

PLEIADES, or **PLEIADS**, a group of stars in the constellation Taurus, the Bull. The stars are so close together that it is a difficult to say how many are seen by the naked eye. According to mythology, the Pleiades were the seven daughters of Atlas, who, being pursued by Orion, were changed by Jupiter into doves. They were afterward translated to the heavens, where they formed the assemblage of the Seven Stars in the neck of Taurus.

PLEONASM, redundancy of language in speaking or writing; the use in speaking or writing of more words than are necessary to express an idea.

PLESIOSAURUS, the typical group of the order *Plesiosauria*. The skin was naked, the head comparatively small, neck disproportionately long, and the tail short. Teeth conical and pointed, with longitudinal striations, each sunk in an independent socket. The paddles consist only of the five digits, without marginal ossicles. It was certainly aquatic; most probably marine, though it may have occasionally visited the shore. Its organization would fit it for swimming on or near the surface, and the length and flexibility of its neck would be eminently serviceable in capturing its prey.

PLEURA, in anatomy, plural, serous membranes forming two shut sacs, each



PLESIOSAURUS

PLEISTOCENE, a term proposed in 1839 by Lyell as an abbreviation for Newer Pliocene; but Edward Forbes, in adopting it, applied it to the next more modern series of beds, called by Lyell Post-Tertiary. Confusion thus arising, its author withdrew the word, but in the "Student's Elements of Geology," he readopted it in the sense of Post-Pliocene. He considers it the older of two divisions of the Post-Tertiary or Quaternary period. Under it are placed the Reindeer period and the Palæolithic age generally, the Brick-earth, the Fluviatile Loam or Loess, the High Plateaux Gravel or Loess, the Cavern and the Glacial Drift deposits. The climate was colder than now, the summers hot and short, the winters long and severe.

PLENIPOTENTIARY, one who is invested with full and absolute powers to transact any business; specifically, an ambassador or envoy accredited to a foreign court, with full powers to negotiate a treaty or to transact other business.

possessed of a visceral and a parietal portion. The former (*p. pulmonalis*) covers the lungs, and the latter (*p. costalis*) the ribs, the intercostal spaces, etc. The term is used of the air-breathing vertebrates in the same sense as above. In the singular form it is applied to the odontophore of the mollusca.

PLEURISY, inflammation of the pleura, going on to exudation, fluid effusion, absorption, and adhesion. A stitch in the side is complained of, the breathing becomes hurried and shallow, and, as the sero-fibrinous deposit becomes greater, intense dyspnœa sets in, with a short, dry, hacking cough.

PLEURO-PNEUMONIA, pneumonia with bronchitis, the former constituting the chief disease.

PLEVNA, a town of Bulgaria, 19 miles S. of the Danube and 85 N. E. of Sophia. Here in 1877 Osman Pasha, the Turkish general, after defeating the Russians in several engagements, intrenched himself. After making an unsuccessful

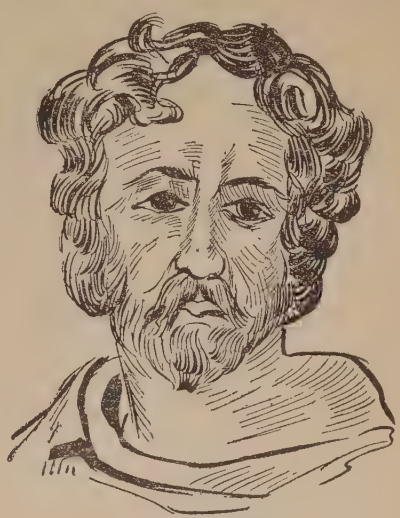
attempt to cut his way through the investing Russian army, he was compelled, provisions and ammunition running short, to capitulate with 42,000 men and 77 guns. The siege cost the Russians 55,000 men, the Rumanians 10,000 and the Turks 30,000. Pop. about 25,000.

PLEYEL, IGNAZ JOSEPH, a German composer; born in Ruppertsthal, near Vienna, June 1, 1757; studied under Haydn and in Italy, and in 1783 was made Kepellmeister of Strassburg Cathedral. In 1791 he visited London, and he harmonized many of the melodies for Thomson's "Collection of Scottish Songs." In 1795 he opened a large music shop in Paris, and in 1807 joined thereto a pianoforte manufactory. His compositions consisted of quartets, concertos, and sonatas. He died in Paris, Nov. 14, 1831.

PLICA POLONICA, Polish ringworm; a disease characterized at first by tenderness and inflammation of the scalp, after which the hairs become swollen, their follicles secreting a large quantity of viscid reddish-colored fluid, which glues them into tufts or masses. The disease is probably caused chiefly by filth. It is endemic in Poland, Russia, and Tartary.

PLIMSOLL, SAMUEL, "the sailor's friend," and English legislator; born in Bristol, England, Feb. 10, 1824. In 1854 he started business on his own account, in the coal trade in London. Shortly afterward he began to interest himself in the sailors of the mercantile marine, and the dangers to which they were exposed in unseaworthy ships, bad stowage, overloading, etc. Failing to induce Parliament to take legislative steps to put an end to these evils, Mr. Plimsoll himself entered Parliament, for Derby, in 1868; but it was not till he had published "Our Seamen" (1873) that he succeeded in getting passed the Merchant Shipping Act in 1876. By this act the Board of Trade was empowered to detain, either for survey or permanently, any vessel deemed unsafe, either on account of defective hull, machinery, or equipments, etc.; a penalty not exceeding $1,500 was incurred by any owner who should ship a cargo of grain in bulk exceeding two-thirds of the entire cargo, grain in bulk being especially liable to shift on the voyage; the amount of timber that might be carried as deck cargo was defined, and enforced by penalties; finally every owner was ordered to mark (often called the "Plimsoll Mark") on the sides of his ships, amidships, a circular disk, 12 inches in diameter, with a horizontal line 18 inches long drawn through its center, this line and the center of the disk to mark the maximum load line—*i. e.* the line down to which the vessel might be loaded, in salt water. In 1890 this act was amended, the fixing of the load line being taken out of the owner's discretion and made a duty of the Board of Trade. Mr. Plimsoll retired from parliamentary life in 1880. In 1890 he published a work on "Cattle-ships," exposing the cruelties and great dangers connected with the shipping of live cattle across the ocean to British ports. He died June 3, 1898.

PLINY, THE ELDER (Caius Plinius Secundus), one of the most celebrated writers of ancient Rome; born in Verona or Como A. D. 23, served in the army of Germany, afterward became an advocate, and was ultimately procurater in Spain. As an inquirer into the works of nature

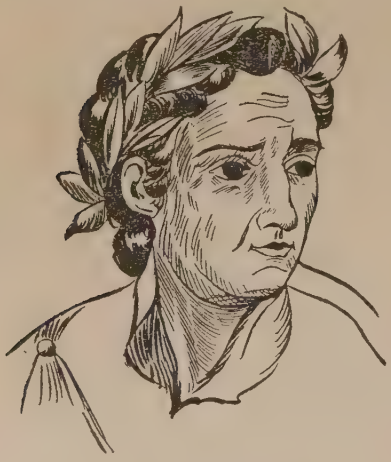


PLINY THE ELDER

he was indefatigable. Being at Misenum with a fleet, which he commanded, on the 24th of August, A. D., 79, his sister desired him to observe a remarkable cloud that had just appeared. Pliny discovering that it proceeded from Mount Vesuvius, ordered his galleys to sea, to assist the inhabitants on the coast, while he himself steered as near as possible to the foot of the mountain, which now sent forth vast quantities of burning rock and lava. Pliny and his companions landed at Stabiæ, but were soon obliged to leave the town for the fields. Pliny, who was very corpulent, fell down dead, suffocated probably by the noxious vapors. The eruption which caused his death was that in which the cities of

Herculaneum and Pompeii were destroyed, in the first year of the Emperor Titus. He wrote several works, which have perished, but his name and fame are preserved by his great work entitled "Natural History," in 37 books. It is a laborious compilation, on almost all branches of natural science, fine arts, inventions, and other subjects. It has been translated into most European languages, and even into Arabic, and has been republished a very great number of times.

PLINY, THE YOUNGER (Caius Plinius Cæcilius Secundis), nephew of the preceding; born in Como A. D. 62. He studied under Quintilian, and in his 18th year began to plead in the forum. Soon after this he went as military tribune to Syria. He settled at Rome; was promoted to the consular dignity by Trajan, in praise of whom he pronounced a famous oration, which is extant. He



PLINY THE YOUNGER

was afterward made proconsul of Bithynia, from whence he wrote to Trajan his curious and well-known account of the Christians, and their manner of worship. The "Epistles of Pliny" are agreeably written, and very instructive; they were translated into English by Lord Orrey and Mr. Melmoth. He died after 112.

PLIOCENE or **PLEIOCENE**, the epithet applied by Sir Charles Lyell to the most modern of the three periods into which he divided the Tertiary. Its distinguished character is that the larger part of the fossil shells are of recent species. Lyell divides it into the Older and the Newer Pliocene. In the Older, the extinct species of shells form a large majority of the whole; in the Newer, the shells are almost all of living species.

There is a rich Pliocene flora in Italy. Mr. Gaudin and the Marquis Strozzi enumerate pine, oak, evergreen oak, plum, plane, elder, fig, laurel, maple, walnut, birch, buckthorn, etc. In the British Pliocene or Crag, Etheridge enumerates 328 genera, and 1,103 species of animals; 30 genera, and 57 species are mammalia. Both Vesuvius and Etna were in operation. The climate, at first temperate, was becoming severe, and the Newer Pliocene was contemporaneous with part of the GLACIAL PERIOD (*q. v.*).

PLOCK, a town of Russian Poland, on the right bank of the Vistula, 60 miles N. W. of Warsaw. Its principal building is the cathedral, built in the 11th century. One of the oldest towns in Poland, Plock was the capital of ancient Masovia, and was severely ravaged by the heathen Prussians, the Lithuanians, and the Swedes. During the World War the town suffered severely by being bombarded and fought over in the struggle between German and Russian forces. Pop. about 40,000.

PLOMBIÈRES, a town in the French department of Vosges, 14 miles S. of Epinal; sprang into fashion through the favor of Napoleon III., though the virtues of its waters were known ever since the times of the Romans. There are nearly 30 springs, ranging in temperature from 66° to 150° F.; their waters are helpful against skin diseases, gout, rheumatism, dyspepsia, female complaints, etc. The permanent population is about 2,000.

PLOTINUS, a Greek philosopher, founder of the Neo-Platonic school; was born in Lycopolis, Egypt, A. D. 203. He was trained in the school of Alexandria, under Ammonius Saccas, then visited the East, and about 244 settled at Rome, where he spent the rest of his life as a teacher and writer. Porphyry, his most eminent disciple, wrote his life, and arranged and published his works, divided into six sets of nine books each ("Enneads"). Plotinus was a profound thinker and a deeply religious man, and his system, a sort of mystical idealism, a combination of Platonic with Oriental notions. He died in Campania, in 270.

PLOVER, the common English name of several wading birds; specifically, the golden yellow, or green plover, *Charadrius pluvialis*. In winter the old male has all the upper parts sooty-black, with large golden-yellow spots on the margin of the backs of the feathers, the sides of the head, neck, and breast with ashy-brown and yellowish spots, the throat

and lower parts white, the quills black. The summer plumage of the upper parts deep black, the front and sides of the neck pure white, with great black and yellow spots. Lower parts mostly deep black. Length about 10 inches. Its nest, in a depression of the ground, is made of a few dry fibers and stems of grass; the eggs, which are highly esteemed as delicacies, are four in number, cream yellow or oil-green, with large

GOLDEN PLOVER

blotches of umber-brown. Plovers are gregarious in habit, and have a wide geographical range. The gray plover is *Squatarola cinerea.*

PLOW, an implement for making a furrow in land, the object being to stir the soil, make a bed for seed, cover seed, hill up earth to crops, lay out lines for planting trees or shrubs, and for other purposes, according to construction. It may be drawn either by animal, steam, or gasoline power. Plows drawn by animal power, *i. e.*, by horses or oxen, are divided into swing plows and wheel plows, the former being without wheels. The wheel plow has a forward carriage to regulate the depth of furrow, one wheel running on the land and the other in the furrow. Besides these there are also plows for special purposes; as, subsoil plows, draining plows, etc. A balance plow is one in which two sets of plow bodies and coulters are attached to an iron frame, moving on a fulcrum, one set at either extremity, and pointing different ways. By this arrangement the balance plow can be used without turning.

In bookbinding, an implement for cutting and smoothing the edges of books.

PLUM, the fruit of *Prunus domestica,* the common plum, a sub-species of *P. communis* or that tree itself. It is a native of the Caucasus and Asia Minor, whence it was introduced into Europe at a very early period. It has run into more than 300 varieties.

PLUMBING, the name applied to the system of pipes, valves, fittings and fixtures installed in buildings which supply water and remove human excrement and liquid wastes. Heating systems and fuel piping are not in the strictest sense considered plumbing.

The earliest pipes were made of lead, but in modern practice this material has been to a large extent replaced by vitrified clay tile, cast or wrought iron, brass and copper. The exposed pipes in modern high grade buildings are nickel plated brass or white enameled metal.

The water is usually brought to the property line by the water company, and connected with the house by a service pipe; the flow through is usually controlled by two valves, one for the water company, which may be located at the curb, and one for the building. Modern practice places a meter in the service pipe just inside the building. Usually there are two sets of pipes, one for hot water, the other for cold. The water is heated by a water front in a range, by a coil in the heating system of the house, or by a special copper coil which is heated by gas, the water usually goes from the heater to a riveted storage tank and is then circulated through the pipes to the various outlets.

The end of each pipe from which water is to be drawn is fitted with a special type of valve called a faucet, and a good design demands that several valves be placed in the pipes in order that the water may be shut off from parts of the system without depriving the entire building from water.

Fixtures. The materials used for fixtures range from solid porcelain to iron. Solid porcelain fixtures are very expensive, liable to break in the handling necessary to installation and are very heavy. Metal fixtures upon which a heavy coating of porcelain has been fused are sanitary, resemble solid porcelain in appearance and are much more common and inexpensive. Marble has its vogue, but is seldom used now. Iron is used for heavy low grade sinks and soapstone for laundry tubs. The common fixtures are sinks, used in kitchens and pantries, laundry tubs, wash bowls, bath tubs, water closets, shower baths and urinals. The modern water closet is of the siphon type in which the flow of water is controlled by a valve. The incoming water takes the place of water already in the bowl of the closet, which carries with it the wastes.

Drainage. All waste water is carried from the house by a system of pipes which connect with the sewerage system. A drain pipe leads from each fixture and the water flows by gravity through a trap or water sealed curved pipe or chamber which prevents gas from the sewer from backing up into the dwelling.

PLUMER, BARON HERBERT CHARLES ONSLOW, a British soldier. He was born in 1857, and entered York and Lancaster Regiment in 1876. He served in the Soudan in 1884 and in South Africa in 1896, when he raised and commanded a corps of mounted rifles. He was in the South African War in 1899-1902, and commanded the 4th Brigade 1st Army Corps in 1902-1903. In 1904-1905 he was quartermaster-general to the Forces, and 3d military member of the Army Council 1904-1905. He commanded the 5th Division of the Irish Command in 1906-1909, and was General Officer commanding Northern Command in 1911-1914. In the World War he commanded the 5th Army Corps till May 1915. In 1915 he was named Grand Officer of the Legion of Honor, and of the Star of Leopold. In 1916 he was promoted General. From 1915 to the close of the war he commanded the 2d Army of the British Expeditionary Force.

PLUNKETT, SIR HORACE CURZON, an Irish leader, born in 1854 of a noble family, he attended both Eton and Oxford University. Soon after graduating from Oxford he went to a ranch in Montana and lived there ten years, gaining that sympathetic understanding of the farmer's needs that has distinguished his work for Ireland. In 1894, after his return to Ireland he founded the Irish Agricultural Organization Society which has accomplished a great work for Irish Agriculture. From 1892 to 1900 he was a Unionist member of Parliament, serving most of the time on Commissions having to do with Irish affairs. Lukewarm at first toward the cause of Irish Home Rule, Sir Horace finally became an exponent of it in 1914. He presided over the convention called by the Prime Minister in 1917 and wrote the majority report. He has recently espoused the cause of a Dominion government for Ireland.

PLUSH, a shaggy pile cloth of various materials. An unshorn velvet of cotton, silk, or mixed fiber, sometimes of a silk nap and cotton back. It has two warps, one of which is brought to the surface to make the nap. The warp is gathered in loops by wire, and cut in the manner of velvet. It is composed regularly of a woof of a single woolen thread and a double warp; the one wool of two threads twisted, the other goat's or camel's hair. Some imitation plushes are made of other materials.

SIR HORACE C. PLUNKETT

PLUTARCH, a Greek biographer and moralist, a native of Chæronea, in Bœotia. In A. D. 66 he was a pupil of the philosopher Ammonius at Delphi. He visited Italy, and spent some time at Rome, lecturing there on philosophy as early as the reign of Domitian. He returned to his native town, where he held various magistracies, and was appointed priest of Apollo. He was still living in 120, but the time of his death is not known. His great work is entitled "Parallel Lives," and consists of biographies of 46 eminent Greeks and Romans, arranged in pairs, each pair accompanied by a comparison of characters. They are written with a moral purpose, and present not orderly narratives of events, but portraitures of men, drawn with much graphic power, with great good sense, honesty, and kindheartedness. Few books of ancient or modern times have been so widely read, so generally admired, as these "Lives." The most important of modern English translations of his work is A. H. Clough's (New York, 1910).

PLUTO, in mythology, the son of Saturn and Ops, inherited his father's kingdom with his brothers, Jupiter and Neptune. He received as his share the infernal regions. All the goddesses refused to marry him; but, on seeing Proserpine, the daughter of Ceres, gathering flowers in the plains of Enna, in Sicily, he became enamored of her, and immediately carried her away. Black victims, and particularly a bull, were the only sacrifices offered to him. The dog Cerberus watched at his feet, the harpies hovered around him, Proserpine sat on his left, and the Parcæ occupied his right hand. Pluto is called by some the father of the Eumenides.

PLUTONIC ROCKS, rocks of igneous or aqueo-igneous origin, believed to have been formed at a great depth and under great pressure of the superincumbent rocks, or in some cases, perhaps, of the ocean. They have been melted, and cooled very slowly so as to permit them to crystallize. Under the plutonic rocks are comprehended granites, syenites, and some porphyries, diorite, tonalite, and gabbro. They belong to all the leading geological periods, even the Tertiary.

PLUVIOSE, the name adopted, in October, 1793, by the French Convention for the fifth month of the republican year. It commenced on Jan. 20, and was the second winter month.

PLYMOUTH, a seaport, municipal and parliamentary borough of England, in Devonshire, at the head of Plymouth Sound, between the estuaries of the Plym and Tamar. Taken in its largest sense, it comprehends what are called the "Three Towns," or Devonport on the W., Stonehouse in the center, and Plymouth proper on the E. The older parts of the town consist of narrow and irregular streets devoid of architectural beauty, but the newer parts and suburbs display an abundance of elegant buildings. The guild hall, a Gothic building, is the finest modern edifice (1870–1874), and has a tower nearly 200 feet high. The citadel, an obsolete fortification built by Charles II., is another object of interest. Plymouth is well defended both by land and sea, by a series of forts of exceptional strength provided with heavy ordnance. The manufactures are not very extensive, and chiefly connected with ships' stores; but the fisheries are valuble, and Plymouth has a large export and coasting trade. Its chief importance lies in its position as a naval station. Thanks to extensive and sheltered harbors, Plymouth rose from a mere fishing village to the rank of foremost port of England under Elizabeth, and is now as a naval port second only to Portsmouth. To secure safe anchorage in the sound a stupendous breakwater has been constructed at a cost of about $10,000,000. The Western Harbor, or the Hamoaze (mouth of the Tamar), is specially devoted to the royal navy, and here (in Devonport, which see) are the dockyard, and Keyham steam yard; the victualling yard, marine barracks, and naval hospital being in Stonehouse. The mercantile marine is accommodated in the Eastern Harbor, the Catwater (200 acres), or estuary of the Plym, and in Sutton Pool, and the Great Western Docks in Mill Bay. In the World War (1914-1918) Plymouth was a naval base for operations against the enemy, and port of entry for the Canadian and other expeditionary forces. Pop. (1917) 179,395.

PLYMOUTH, a town and county-seat of Plymouth co., Mass.; on Plymouth Bay, and on the New York, New Haven, and Hartford railroad; 37 miles S. E. of Boston. The town has electric lights, water works, electric street railroads, court house, public library, National and savings banks, and several daily and weekly newspapers. It has a large industry in cod fish, and manufactures of cordage, cotton, ducks, woolen and cotton goods, zinc, steel and iron products, cooperage, etc. Plymouth is of importance as the spot where the Pilgrim Fathers landed on Dec. 21, 1620. A portion of the rock on which they first stepped has been placed in front of Pilgrim Hall, in which are preserved old books, paintings, pictures, and other valuable relics. The rock itself is in Water Street, and is covered by a handsome granite canopy. Plymouth also has the National monument, 81 feet high, erected to the Pilgrims at a cost of $200,000, and dedicated in 1889. There are also statues of Faith, Morality, Law, Freedom, and Education. Pop. (1910) 12,141; (1920) 13,045.

PLYMOUTH, a borough of Pennsylvania, in Luzerne co. It is on the Susquehanna river and on the Delaware, Lackawanna, and Western railroad. It is the center of an important coal mining and coal trading region. Its industries include the manufacture of mining drill machines, hosiery, silk, lumber products, etc. Pop. (1910) 16,996; (1020) 16,500.

PLYMOUTH BRETHREN, a body which arose almost simultaneously in Dublin and Plymouth, about 1830, and, as they called themselves "The Brethren," outsiders came to know them as "Plymouth Brethren" from the town where they had fixed their headquarters.

Their chief founder was a lawyer, named Darby, who had taken orders. Their communities are of what is known as the Evangelical Calvinistic type, and many of them maintain that only among themselves is true Christianity to be found. They have no regular ministry, every brother being at liberty to prophesy or preach whenever moved to do so. They baptize all adults, whether previously baptized or not, and observe the Sacrament of the Lord's Supper weekly. They are rigid Predestinarians and expect the millennium.

by Latimer Clark in 1853, improved by Varley in 1858, and again by Siemens in 1863. The invention of Latimer Clark and Varley required a separate tube between each pair of stations, and admitted of only a single dispatch at a time; but a system of laying tubes in circuit for the continuous transmission of dispatches, by means of an uninterrupted air current in one direction, was adopted in Berlin by Siemens and Halske in 1863, and introduced in London in 1870. Both systems are in use in London with modifications to suit special traffic.

PLYMOUTH ROCK

PLYMOUTH ROCK. See PLYMOUTH (Mass).

PLYMOUTH SOUND, an arm of the sea, on the S. W. coast of England, between the counties of Devon and Cornwall. It is about 3 miles wide at its entrance, bounded by elevated land, which descends abruptly to the sea. It contains Drake Island, which is fortified, and the celebrated Plymouth breakwater. See PLYMOUTH.

PNEUMATIC DISPATCH, propulsion by means of compressed air or by forming a vacuum. Pneumatic railways have thus far proved abortive, but propulsion by compressed air has of recent years been successfully applied to a variety of practical uses. Parcels are thus conveyed, and internal communication in warehouses, hotels, etc., is carried on by its means. The most developed application of compressed air as a motive force is in connection with the telegraph service of large cities. Pneumatic dispatch, which has proved a most useful auxiliary in securing prompt and cheap collection and distribution of telegraphic messages, was first introduced in London

Pneumatic tubes are in use in Liverpool, Manchester, Glasgow, Dublin, etc. The circuit system, but not with a continuous current, is extensively used in Paris. The tubes are of iron two feet in diameter. Trains leave the central station at fixed intervals and make the circuit. Other European cities have similar systems. New York, Philadelphia, and other American cities use a pneumatic mail dispatching system. This is being superseded to some extent (1920) by swift motor vehicles.

PNEUMATIC GUN, a gun operated by compressed air.

PNEUMATIC TIRE, a rubber tire made hollow and then inflated with air. In common use for the wheels of motor-cars, bicycles, etc.

PNEUMATIC TOOLS, a class of tools which operate by compressed air. They are usually portable, and used for metal, wood or stone work. The tools are of great variety and are put to many uses, but all of them are one of two types—percussion or rotary. In both types the motor is contained in the tool, and air

under pressure is conducted to the tool by a hose.

Percussion Tools.—Tools of this type are the air hammer, clippers, chippers, caulkers, balast tappers, riveters, etc. The action in all is essentially the same. Air, under pressure of 85 to 100 pounds per square inch (except in the case of riveters where it is under higher pressure) is sent into a cylinder containing a piston, which is made to reciprocate in the cylinder by proper valve action, the tool is supported in the front end of the cylinder, and transmits the blow received from the piston to the work. George Law, an Englishman, invented the first pneumatic tool, a percussion rock drill, in 1865. In this tool, as in most which have followed, the opposite end of the drill from the tool end was fitted with a handle and a controlling throttle. Boyer of St. Louis, Mo., invented the chipping hammer in 1896, and in 1899 Keller brought out the first valveless hammer, in which there is no valve beyond the position of impact, while the valve hammers are fitted with a reciprocating valve which regulates the inlet and exhaust of the driving air. Modern engineering has introduced many improvements and refinements and many patents have been issued on various methods of actuating and controlling the device. In general the valve type has a longer stroke, and a more powerful blow than the valveless type, while the latter operates at a much higher rate of speed, sometimes over 20,000 strokes a minute, and it is claimed (which claim is not uncontested) by some engineers that valveless types have a much longer life and are less liable to get out of order. The percussion tools vary in size from a small hand hammer to the large stationary plate riveter weighing tons.

Rotary Tools.—The principal rotary pneumatic tools are the drills, reamers, etc. They are made in a great range of sizes, and are used for many things, such as drilling wood and metal, reaming boiler tubes, grinding valve seats and cylinders, polishing and grinding. The rotary tools usually operate under a pressure of about 75 pounds per square inch. The motor may be of the rotary type or of the reciprocating type with either fixed or oscillating cylinders, operating on a crank shaft to which the tool is fastened by a suitable mechanism. The great demands on the part of the shipyards for pneumatic tools of all types at the time of the World War gave even greater impetus to the already great and fast growing industry of manufacturing pneumatic tools.

PNEUMOCONIOSIS, affection of the lungs arising from occupation in a dust-laden atmosphere. It takes a form of chronic bronchitis, with the development of a catarrhal condition and partial pneumonia, shrinking and coloring the tissues. Among stone cutters the disease is known as phthisis, and among coal miners as anthracosis. Its manifestations vary with the occupation, but the mortality is heavy in all.

PNEUMOGASTRIC NERVE, a nerve, called also *par vagum*, which, proceeding from the neck to the upper part of the abdomen, supplies branches to the pharynx, œsophagus, stomach, liver, spleen, and respiratory passages.

PNEUMONIA, inflammation of the lung, usually caused by exposure to cold or wet, a cold draught or chill after being over-heated, injury to the chest, irritation, or as a secondary affection in smallpox, typhoid or puerperal fever, and other low wasting diseases; it may also be caused by long continued congestion of the lung substance, particularly in heart disease, or in old and weak people who are bedridden from any cause. Pneumonia terminates generally in resolution and recovery, but sometimes in death from collapse and exhaustion.

PO, the largest river of Italy, rises on Monte Viso, one of the Cottian Alps, at an altitude of 6,405 feet, close to the French frontier. It flows E. for upward of 20 miles, when, arriving before Saluzzo, it emerges from its rocky defiles and enters upon the plain. From Saluzzo it flows N. N. E. past Turin to Chivasso; there it changes its course toward the E., in which direction it flows to its embouchure in the Adriatic. Upward of 55 miles from its mouth, above Ferrara, it begins to form its delta, 60 miles wide from N. to S. The delta is rapidly growing in area. Ravenna, a city once on the seashore, now stands 4 miles inland. The Po receives from the left the Ticino, Adda, Mincio, and other streams and from the right the Trebbia and others. It has an entire length of 360 miles, and drains an area of nearly 28,900 square miles.

POACHING, the trespassing on another's property for the purpose of killing or stealing game or fish. According to the law of England, when a person's land adjoins a stream where there is no ebb and flow that person is assumed to have an exclusive right to fish in the stream as far as his land extends, and up to the middle of the stream; and so also when a person's land incloses a pond, the fish in that pond belong to him. Where several properties are con-

tiguous to the same lake the right of fishing in that lake belongs to the proprietors, in proportion to the value of their respective titles. Exclusive right of fishing in a public river, that is, one in which there is an ebb and flow up to the tidal limit, or a portion of the sea, is held by some proprietors by virtue of royal franchises granted prior to the Magna Charta. Any person, not an angler, found fish poaching on private property is liable to a maximum fine of $25 in addition to the value of the fish; an angler's fine does not exceed $10. In Scotland, as a general rule, the right of catching fish other than salmon belongs to the owners of the land on the banks of the waters. As to property in salmon fishings that is held to be originally vested in the crown, not only for the rivers of Scotland but also for the coasts, and no person accordingly is allowed to fish for salmon unless he possesses a grant or charter from the crown enabling him to do so. The fact is, however, that nearly all the chief landed proprietors do possess such rights.

POBEDONOSTSEV, KONSTANTIN PETROVITCH, a Russian statesman and author. He was born in 1827 at Moscow, and became professor of civil law in the university of his native city, and tutor to the czar's family. In 1880 he became procurator of the Holy Synod, and established elementary schools. In politics he favored absolutism, and wrote numerous works, mostly legal, to that end. He died in 1907.

POCAHONTAS, daughter of Powhatan, a powerful Indian chief of Virginia; born about 1595. She displayed a friendliness toward the British colonists, first at 12 years of age, in saving the life of Capt. John Smith, who had been captured and condemned to death by her father. In 1612, while on a visit to a neighboring tribe, she was seized and held as a hostage by the English. While on shipboard she became acquainted with, and married John Rolfe, an Englishman, who took her to England, where, in 1616, she was presented at court. She had one son, from whom numerous wealthy families of Virginia claim descent. She died in England, while preparing to return to America, in 1617.

POCATELLO, a city of Idaho, the county-seat of Bannock co. It is on the Port Neuf river, and on the Oregon Short Line railroad. It is the center of an important mining, stock raising, and agricultural region, and has the division headquarters and machine shops of the Oregon Short Line railroad. It is the seat of the Idaho Technical Institute and of the Holy Cross School, public library, and Y. M. C. A. buildings. Pop. (1910) 9,110; (1920) 15,001.

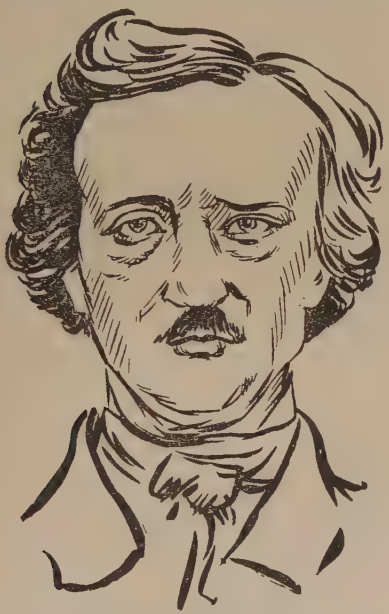
PODESTA, the title of certain officials sent by Frederick I. in the 12th century to govern the principal cities of Lombardy. Also a chief magistrate of the Italian republics of the Middle Ages, generally elected annually, and intrusted with all but absolute power, and an inferior municipal judge in some cities of Italy.

PODIEBRAD, GEORGE BOCZKO, King of Bohemia; born of a noble family in Podiebrad, April 6, 1420, and became an adherent of the moderate party of the Hussites. When the Catholic barons (1438) carried the election of Albert V. of Austria (II. of Germany), Podiebrad allied himself with the Utraquists in Tabor, who offered the sovereignty of Bohemia to Casimir, King of Poland. After forcing Albert to raise the siege of Tabor and retire to Prague, Podiebrad was recognized as the leader of the Utraquists; then he seized on Prague (1448), and got himself made governor or regent of Bohemia, from 1453 to 1457, for the young king Ladislaus. On the death of Ladislaus, Podiebrad was chosen his successor, and was crowned early in 1458. In 1462 he decided to uphold the terms of the *compactata* of Prague (1433); this angered the Pope, Pius II., and he was only prevented from excommunicating Podiebrad by the emperor. The next Pope, Paul II., did in 1466 promulgate against him the ban of excommunication. Matthias Corvinus of Hungary was the only prince who took the field to enforce it; but him Podiebrad surrounded at Wilamow (1469) and forced into a truce. Nevertheless Matthias was crowned king by the Catholic barons at Olmütz immediately afterward. Podiebrad died March 22, 1471.

PODOLIA, or **KAMENETZ**, a government of West or "White" Russia, N. of Bessarabia, and bordering on the Austrian frontier; area, 16,224 square miles; pop. about 4,250,000, the majority of whom are Russniaks. The surface is a table-land, strewn with hills; nearly three-fourths is either arable or available for pasturage. Since the World War (1914-1918) a part of the independent state of Ukrania.

POE, EDGAR ALLAN, an American poet and story-writer; born in Boston, Jan. 19, 1809. Left an orphan early, he was adopted by John Allan, of Richmond, Va., and at the age of 19 left this home and published his first volume of verse at Boston. He was a cadet at

the United States Military Academy, 1830–1831; and subsequently was editor of the "Southern Literary Messenger," 1835–1837; of the "Gentleman's Magazine," 1839–1840; of "Graham's Magazine," 1841–1842; and of the "Broadway Journal," 1845. He also contributed to other periodicals. He projected a magazine to be called "Literary America," and to aid it, lectured in New York City and through the South, 1848–1849. A complete list of his works in book form includes: "Tamerlane and Other Poems" (Boston, 1827); "Al Aaraf, Tamerlane, and Minor Poems" (Baltimore, 1829); "Poems" (2d ed., including many poems now first published, New York, 1831). "The Narrative of Arthur Gordon Pym, of Nantucket" (New York, 1838); "The Conchologist's First Book" (Philadelphia, 1839); "Tales of the Grotesque and Arabesque" (Philadelphia, 1840); "The Prose Romances of Edgar A. Poe" (Philadelphia, 1843); "The Raven and Other Poems" (New York, 1845); "Mesmerism: in Articulo Mortis" (London, 1846); "Eureka, a Prose Poem" (New York, 1848). After his death there were republished "The Liberati: Some Honest Opinions about Autorial Merits and Demerits, with Occasional Words of Personality," etc., edited by R. W. Griswold (New York, 1850); "Tales of Mystery, Imagination, and Humor; and Poems," edited by Henry Vizetelly (London, 1852). The definitive edition is the one edited by E. C. Stedman and G. E. Woodberry (10 vols., Chicago, 1894–1895). Poe died in Baltimore, Md., Oct. 7, 1849.



EDGAR ALLAN POE

POELCAPELLE, a village N. E. of Langemarck, about 10 miles N. of Ypres, in Belgium, which was the scene of many battles during the World War. It is little more than a cluster of houses at the crossing of several roads of strategic importance and during the third battle of Ypres in October and November, 1917, was bitterly fought for. British troops succeeded in taking it and advancing half a mile N. E. of it during that battle, the 53d Brigade of the Eighteenth Division carrying the point known as Meunier Hill after hard fighting.

POET LAUREATE, an office in the household of the sovereigns of Great Britain, the appellation having its origin in a custom of the English universities, which continued to 1512, of presenting a laurel leaf to graduates in rhetoric and versification, the king's "laureate" being a graduated rhetorician in the service of the king. The first appointment of a poet laureate dates from the reign of Charles II., the first patent being granted in 1670. It was formerly the duty of the poet laureate to write an ode on the birthday of the monarch, but this custom has been discontinued since the reign of George III. Among those who have held this office may be mentioned Dryden, Southey, Wordsworth, and Tennyson. Robert Bridges was appointed in 1913.

POETRY, that one of the fine arts which has for its object the creation of intellectual pleasure by the use of imaginative and passionate language, which is generally, though not necessarily, formed in regular measure; the art of producing illusions of the imagination by means of language. Also poetical, imaginative, or passionate language or compositions, whether expressed rhythmically or in prose. Thus, many parts of the prose translations of the Bible are genuine poetry. In its widest sense, poetry may be defined as that which is the product of the imaginative powers and fancy, and which appeals to these powers in others.

The ancient Hindu Vedas consists in large measure of rhythmical hymns. Hindu poetry reached its highest development in the epics of the Ramayan and the Mahabharat. Specimens of that of the Hebrews, made conspicuous to the English reader by being printed in separate lines in the revised version, are found in Gen. iv: 23–24, ix: 25–27, xxvii:

39, 40, xlix: 2–27, and Exodus xv: 1–18, 21. It reached its highest development in the books of Job and of Psalms. The poetry of the Greeks began with Homer and Hesiod, and continued till about 500 B. C. The chief poets of Rome came late on the scene, Vergil being born 70 B. C., and Homer 65 B. C. Geoffrey Chaucer, the father of English poetry, died A. D. Oct. 25, 1400; John Barbour, author of the "Bruce" (1373), was the first Scotch poet. Of the English poets of high genius were Chaucer in the 14th, Shakespeare and Spenser in the 16th century, Milton and Dryden in the 17th, Pope and Cowper in the 18th, Byron, Keats, Shelley, Tennyson, etc., in the 19th. Of Scotch poets, Burns in the 18th century. Of American poets, Longfellow, Poe, Bryant, Whittier and many others, all living in the 19th century. For poetry of the 20th century, in the United States see the works of Amy Lowell, Untermeyer, Forest, Pound, Sandburg, etc.

POETS' CORNER, THE, in Westminster Abbey, the S. corner. This is merely a popular name. The poets represented are: Addison, Beaumont, S. Butler, Campbell, Cowley, Davenant, Drayton, Dryden, Gay, Goldsmith, Gray, Dr. Johnson, Ben Jonson, Longfellow, of America, Macauley, Mason, Milton, Philips, Prior, Rowe, Shakespeare, Shadwell, Sheridan, Spenser, and Thomson.

But there is no memorial to such poets as the following: Akenside, Mrs. Browning, Byron, Burns, Carew, Cartwright, Chaucer, Churchill, Coleridge, Collins, Cotton, Cowper, Crabbe, Denham, Donne, Fletcher, Mrs. Hemans, Herbert Herrick, Hogg, Hood, Keats, Miss Landon, Lee, Lovelace, Marlowe, Marston, Massinger, Moore, Parnell, Pollock, Pope, Raleigh, Ramsay, Rossetti, Scott, Shelley, Shenstone, Southern, Southey, Waller, Wither, Wolfe, Wordsworth, Young, and several others.

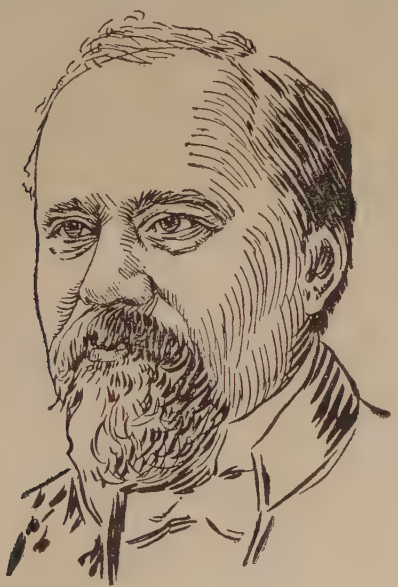
POGGIO, BRACCIOLINI, GIAN FRANCESCO, an Italian humanist; born in Castel Terranuova, near Florence, Feb. 11, 1380. By his untiring research of the monastery libraries of Switzerland and Germany he brought to light MSS. supposed to have been lost, of works of the ancient classics, as Quintilian, Valerius Flaccus, Ascanius, Statius, Ammianus, and many others. He translated into Latin several of the Greek classics. His own writings are: "Facetiæ," a work of the same questionable character as others of the same title—the book had 26 editions at the end of the 15th century; "Of the Variances of Fortune"; a "History of Florence"; "The Miseries of Human Life"; "The Infelicity of Princes"; "On Marriage in Old Age"; "Dialogue Against Hypocrites." He died in Florence, Oct. 30, 1459.

POGROM, a Russian word which first gained current usage in the English language in 1903, when Russian ruffians, instigated by the higher authorities, made an attack on the Jewish quarter of Kishinev, in Russian Bessarabia, killing fifty persons and injuring some hundreds of others. The word is almost equivalent to "massacre." Russian pogroms, however, first took place in 1881, after the assassination of Czar Alexander II., when the reactionary officials of the government, to divert the dicontent of the people away from the evils of the government, stimulated race hatred against the Jews. A secret propaganda was promulgated among the ignorant peasants, putting the blame for their economic sufferings on the Jews, who had monopolized most of the small trade of the towns. Out of this agitation sprang a secret organization, officially known as the Union of the Truly-Russian People, but more popularly called the Black Hundreds. This organization, backed by the secret support of the more reactionary officials, not only carried on a persistent anti-Semitic propaganda, but actually instigated thousands of pogroms, of which that in Kishinew was only the first to attract world-wide attention. The result of these violent attacks was to drive hundreds of thousands of the Russian Jews out of the country, most of whom eventually found refuge in the United States. Pogroms have also been extensively practiced in Poland, since the establishment of independence by that country after the World War, to split the radical opposition against the conservative government of the Paderewski régime.

POILU, a popular name for the French soldier, meaning literally "hairy," from the French "poil," hair, and alludes to his unshaven and unkempt appearance during campaigns. The sobriquet parallels the use of Tommy Atkins in England, and Doughboy in the United States.

POINCARÉ, RAYMOND, French statesman, born at Bar-le-Duc, August 20, 1860. He was educated in the Lyceum of Louis le Grand. He early entered politics and in 1893 was appointed Minister of Public Construction. He filled this office again in 1895. In 1894 and again in 1906 he was Minister of Finance. From 1911 to 1913 he was Premier. In the latter year he became President of the Republic. He was President during the entire period of the

World War, and his aggressive policies, following the outbreak of the war did much to enable France to meet the many crises of the great struggle. President Poincaré was a frequent visitor in the war area and his presence did much to encourage and harden the French soldiers. He was succeeded as President in January, 1920, by PAUL DESCHANEL (*q. v.*) who was, however, obliged to resign on account of illness, and was succeeded by Alexandre Millerand, on September 16, 1920. M. Poincaré published several studies in literature and politics, including "How France is Governed" (1913). Following his resignation he became leader of the opposition, although he heartily supported the government in negotations in 1920 and 1921 following the attempted settlement of economic and political conditions in Europe.



RAYMOND POINCARÉ

POINDEXTER, MILES, United States Senator from Washington. Born at Memphis, Tenn., in 1868, and educated at Washington and Lee University, he moved to the State of Washington in 1891, where he took up the practice of law. After serving as district attorney, and later judge of Spokane co., he was elected to the National House of Representatives as a Republican in 1909, and at the expiration of his term was chosen United States Senator. He received the support of the Republicans in the State of Washington as a candidate for the presidential nomination in 1920.

POINSETTIA, a genus of *Euphorbiaceæ*, now merged in Euphorbia itself. *P. pulcherrima* is a highly ornamental stove plant, with rose-like whorls of bracts.

POINT, in geometry, a quantity which has no parts, or which is indivisible, or which has position without magnitude. Points may be regarded as the ends or extremities of lines. If a point is supposed to be moved in any way, it will by its motion describe a line.

POISON. Professor Christison divides poisons into three great classes: Irritants, narcotics, and narcotico-acrids, or narcotico-irritants. A fourth class is sometimes added, septics, consisting of animal poisons, such as the bites of rabid animals and venomous snakes, the stings of insects, and the poison generated by pestilential carbuncle, etc. An irritant poison produces violent pain and cramp in the stomach, nausea, vomiting, convulsions, etc. A narcotic poison produces stupor, numbness, drowsiness, coldness, and stiffness of the extremities, etc.; a narcotico-acrid poison produces a certain combination of the symptoms attendant on both the former classes. Savages poison their arrows with the milky juice of various Euphorbias or of the manchineel, or by the juice of two species of Strychnos. Both in man and in the inferior animals there is often a curious correlation between the color of the skin and hair and immunity from the action of certain vegetable poisons. Metallic poisons act on vegetables nearly as they do on animals, that is, they are absorbed into the different parts of a plant, destroying the structure. Vegetable poisons, especially those which destroy animals by action on their nervous system, also cause the death of plants.

POISON GAS, USE IN WARFARE. The employment of poisonous or suffocating gases in warfare dates back to early times, the use of "stink pots" containing burning sulphur and similar materials producing noxious fumes being common among the ancients. It remained, however, for the World War of 1914–1918 to bring the practice to a high state of development. The use of such gases in warfare was forbidden by the Hague Convention of 1899, but poison gases were introduced by the Germans early in 1915, and their use was afterward adopted by the armies of the Allies. Many different compounds were employed, and substances, which had previously been considered as of academic interest only, were manufactured in vast quantities. The gases were projected by two different methods; by the

first, the gas, either liquified or highly compressed, was brought in cylinders, as near to the enemy's trenches as possible, and sent over in a cloud, favoring winds being necessary to carry the cloud in the right direction; by the second, the gas was introduced into a shell of special type, which was fired at the enemy, and, on exploding, spread the gas among his troops. Both methods were first used by the Germans on April 22d, 1915, against the French, on a frontage of four miles, N. of Ypres salient. The cloud method of attack, however, was too uncertain in its results, and was practically abandoned in the later years of the war in favor of the gas shell, the last extensive German cloud attack occurring in the summer of 1916. Chlorine was the gas first used in cloud attacks, a mixture of chlorine and phosgene (*q. v.*) being used later. The early gas shells contained chlorinated ketones or chlorinated xylene (both lachrymatory or "tear" gases), but they were largely ineffective owing to the fact that they were charged with too much high explosive, leading to too great a dispersion of the gas. The development of the gas shell into a more deadly weapon was brought about by the French, who saw the necessity for a thin-walled shell, containing a comparatively small charge of high explosive. As finally developed, the gas shell consisted of a thin-walled chamber, fitted with a fuse connected with an inner tube containing high explosive. The gas, frequently in liquid form, was often placed in a glass or lead container, the rest of the space being filled with cement. The shells were sent over either by artillery proper, or by smaller guns or types of trench mortars. The area covered by shells averaged five hundred yards in depth, although with a favoring wind the effects of gas have been felt at a distance of 3,000 yards from the explosion.

Poison gases, as used in the World War may be classified into (1) Arsenic poisons; (2) Asphyxiating gases; (3) Lethal lachrymatory, and (4) Lachrymatory. MUSTARD GAS (*q. v.*) may be considered as in a class by itself. Of the first class, two types are used—liquid filled and solid filled. The liquid filled shell contained ethyldichlorarsine, $C_2H_5AsCl_2$, while the solid filled contained fused arsenic compounds, diphenylchlorarsine being first used, diphenylcyanarsine being later substituted for it. When the latter type exploded, the solid poison was blown into the air as a very fine dust. These shells seldom, if ever, produced fatal results, the chief effects being a burning of the nose and throat, with pains in the neck, chest and stomach, sometime followed by dizziness, nausea and vomiting. They had some value owing to the property these compounds possess of producing a tickling of the nose followed by an overpowering desire to sneeze. A group of men affected in this way would be tempted to remove their gas masks, thus exposing themselves to the deadly action of a gas of a more toxic character. The most commonly used asphyxiating gases were phosgene and diphosgene (trichlormethylchloroformate). Chlorpicrin was also used. The persistence of these gases was slight, but the percentage of deaths to casualties was probably higher in this group than in any of the others. Trench mortar bombs usually contained phosgene. The commonest lethal lachmimatory gases were mixtures of brominated ketones, or brominated xylene. Like all lachrymatories, these gases affected the eyes, producing excessive watering, and sometimes temporary blindness. Opinions differ somewhat regarding the toxic effect of these gases, but the number of actual deaths caused by them was probably small. The gases were very persistent, effects lasting for as long as six hours, even with a breeze. Lachrymators, or tear gases, affect the eyes only. The most commonly used were benzyl bromide and phenyl carbylamine chloride, the latter first appearing as late as September, 1917. These gases produce temporary blindness when sufficiently concentrated. They are very persistent and effects will be felt for as long as twenty-four hours.

Mustard gas or dichlorethylsulphide $(CH_2Cl\ CH_2)_2\ S$, is a water-white liquid, boiling at 219°C. It was first used by the Germans at Ypres on July 20th, 1917, and came to be the most widely used of all the poison gases. The liquid had a corrosive action on the skin, while the vapor attacked the eyes and lungs and any other moist surface. It was very persistent, from two to seven days being required to clear a position shelled with mustard gas. (See MUSTARD GAS).

A device connected with the use of poison gas was invented late in 1916 by Major W. H. Livens, of the British army, and was known as the Livens projector. It enabled a large number of bombs to be fired simultaneously at any desired spot, thus producing high concentration, with practically no warning. Statements have appeared in the press that the United States Chemical Warfare Service had, at the time of the Armistice, developed a gas far more deadly than mustard gas, but detailed information on this subject has never been given by the authorities.

POISON IVY, a climbing plant which closely resembles the woodbine and which is very irritating to sensitive skins. It may be distinguished from the woodbine by its having only three leaves on a twig, while all other harmless vines have five leaves, one for each finger of the hand. A simple remedy for the poison is a weak solution of common baking soda and water, applied immediately after exposure.

POISSON, SIMÉON-DENIS, a French geometer; born in Pithiviers, department of Loiret, June 21, 1781; and displaying an aptitude for mathematics, he was received into the École Polytechnique in 1798. In 1802 he became a professor in the Polytechnique; in 1808 a member of the Bureau des Longitudes; in 1809 professor in the Faculty of Sciences; member of the Institute in 1812, etc.; and this list of distinctions was crowned in 1837 by his elevation to the dignity of a peer of France. Poisson's whole life was devoted to the prosecution of scientific research, and the fruits of his pen number about 300 memoirs. Of the separate treatises published by Poisson, the best known is the "Treatise on Mechanics" (1833); others were on capillary action, the mathematical theory of heat, the motion of projectiles, and, lastly, the celebrated work "On the Invariability of the Mean Movement of the Planetary Axes." Poisson is fairly considered one of the chief founders of the science of mathematical physics. He died April 25, 1840.

POITIERS, or POICTIERS, a town of France, on the Clain, formerly capital of the province of Poitou, at present of the department of the Vienne. The town occupies a large space, the houses being often surrounded by gardens and orchards. The principal edifice is the cathedral, founded by Henry II. of England about 1162. Poitiers is one of the most ancient towns of France, and the vestiges of a Roman palace, of Roman baths, of an aqueduct, and an amphitheater still remain. Two famous battles were fought in its vicinity, that in which Charles Martel defeated the Saracen army in 732, and that between the French under their king John II., and the English under Edward the Black Prince in 1356. The manufactures are unimportant, but there is a large trade. Pop. about 42,000.

POITOU, a former province of S. W. France, coincident with the present departments of Deux Sèvres, Vendée, and Vienne. It was divided into Upper and Lower Poitou, and had for its capital Poitiers. Its early history is the same as that of AQUITANIA (*q. v.*). Poitou became a possession of the English crown when Eleanor, Countess of Poitou and Duchess of Aquitaine, after her divorce from Louis VII. of France, married (1152) Henry of Anjou, afterward Henry I. of England. Philip Augustus reconquered the province in 1205. By the peace of Bretigny, in 1360, it again reverted to England, but nine years later was retaken by Charles V.

POKER, a game played with a full pack of cards, five being dealt, one at a time, to each player in rotation, beginning at the left of the dealer. The player winning the "pool," or "pot," always deals. An exposed card may be accepted or rejected; in the latter case it must be placed at the bottom of the pack. The cards rank in value as at WHIST (*q. v.*). The game admits of a number of players, from 2 to 10.

POKEWEED, the *Phytolacca decandra*, a North American branching herbaceous plant, order *Phytolaccaceæ*, which is naturalized in some parts of Europe and Asia. Its root acts as a powerful emetic and cathartic, but its use is attended with narcotic effects. Its berries are said to possess the same quality; they are employed as a remedy for chronic and syphilitic rheumatism, and for allaying syphiloid pains. The leaves are extremely acrid, but the young shoots, which lose this quality by boiling in water, are sometimes eaten in the United States as asparagus.

POLA, until the World War of 1914–1918, the most important naval station of Austria-Hungary; situated near the S. extremity of the peninsula of Istria; 105 miles S. of Trieste. The harbor is thoroughly sheltered, deep, and spacious enough to accommodate the largest fleet. The town is protected by forts and batteries, and is overlooked by the citadel, by which it and the bay are commanded. There are also artillery and powder stores, docks, slips, etc. The cathedral dates from the 15th century. Pola is also a shipping port, exporting wood, fish, sand and building stones, and importing provisions, coal, and bricks. Founded traditionally by the Colchians who were sent in pursuit of Jason, Pola was destroyed by Augustus, but rebuilt at the request of his daughter, Julia, on which account it was named Pietas Julia. It was destroyed in 1267 by its Venetian masters, who had conquered it in 1148; and in 1379 the Genoese, after routing the Venetians in a sea fight off the town, once more ravaged it. But it only passed from Venice in 1797 to Austria, who chose it as her chief naval harbor

in 1848. It contains numerous interesting Roman remains, among them a well preserved amphitheater, 450 feet long and 360 broad. A temple and several ancient gates are also extant. Pop. about 75,000. Pola was the scene of several mutinies during the World War that led to many executions. In the night of Oct. 31–Nov. 1, 1918, two Italian officers, Col. Rossetti and Dr. Paolucci, swam into the harbor and destroyed the new Austrian superdreadnought, "Viribis Unitis."

POLAND, a former kingdom situated in the N. E. of Europe. It was bounded on the N. by the Baltic, S. by Wallachia, Moldavia and Hungary, W. by Germany, and E. by Russia, and was the most level country in Europe, the Carpathian Mountains on the S. and W., as a boundary from Hungary, being the only mountain range of any height in the kingdom. The principal mineral products are iron, lead, gold, silver, and salt. Cattle and wheat are still the chief agricultural products. Poland was anciently divided into 12 provinces, each of which was governed by a chief, called a "Palatine." The Poles were originally a tribe of Vandals, whose history is quite unknown before the 6th century. About the year 750, the people, oppressed by their petty chiefs, were resolved to shake off the tyranny of their rulers, and elected a chief magistrate to govern them, under the title of duke. This state of things endured till the year 999, when reigning duke, Boleslass, having made himself illustrious by his conquests and military genius, was dignified with the title of king by Otho III., Emperor of Germany, from which time the title became established in Poland, and, though the crown was elective, it often continued in the same family for many years, passing from father to son. From the 13th century, the Poles became the most warlike nation in Europe, and from the time when the Turks first crossed the Hellespont and settled in Greece, Poland was denominated the shield of eastern Europe. In 1674, John Sobieski was advanced to the kingly dignity, and under him the Polish arms acquired a glory that eclipsed all other nations of that age. Sobieski formed a league with the Emperor Leopold, and when that monarch had been defeated, and his capital on the point of falling into the hands of the Turks, Sobieski advanced to Vienna, raised the siege, and, defeating the invaders, drove them back in rout to Constantinople. The War of Succession that succeeded, between Charles XII. of Sweden and Frederick Augustus of Saxony, almost ruined the kingdom, and hastened its fatal end. Count Poniatowski who, in 1764, was elected to the throne with the name of Stanislaus Augustus, was the last king of Poland. Under this unfortunate sovereign, the country became the theater of a long and devastating war; the cities were pillaged, the country deluged by hosts of Cossacks and brutal Muscovite soldiery, and Poland in the end divided between Catharine of Russia, Joseph II., Emperor of Germany, and Frederick of Prussia. This shameful partition of an ancient nation, which drove Stanislaus in exile to France, was perpetrated in 1772. In 1795, a further dismemberment was effected between the three great powers, and the whole of Poland absorbed, except the ancient city of Cracow, with a few miles of adjacent country, which, elected into a free and independent State, was left to point to future ages where the once warlike nation of Poland stood on the physical map of Europe. Frequent insurrections have occurred. In 1830, a revolution took place, but ended in the surrender of Warsaw and the dispersion of the Poles. In 1832, what remained of Poland was declared a part of the Russian empire. In 1846, an attempt was made at Cracow to recover independence, but it ended in the subjugation of the last remnant of the country, which was annexed to Austria. In 1863, the Polish people, under the leadership of Langiewicz, made another abortive attempt to free their country from the Russian yoke. In 1864, Poland was deprived of its administrative independence, and in 1868 was incorporated absolutely with Russia; trial by jury was abolished and the use of the Polish language officially (for signboards, railways, wills, etc.) was prohibited. At the outbreak of the World War (1914–1918) Austrian Poland enjoyed autonomy. Russian Poland was invaded and occupied by German and Austrian armies in 1915. In November, 1916, the German and Austrian Emperors proclaimed the independence of Poland. Regency councils were appointed in 1917 and attempts were made to frame a constitution, but nothing effective was accomplished. In October, 1918, the council and convocation proclaimed a Constitutional Assembly to take direction of the country. In December, 1918, a republic was established and Joseph Pilsudski was made president. In 1919 Poland suffered from enemies without and within. She was attacked by Russian Soviet Government forces, and in the spring and summer of 1920 waged a successful offensive war against the Russians, which concluded with a treaty of peace between the countries in December, 1920.

POLAR BEAR, *ursus maritimus*, the largest individual of the family *Ursidæ*, and one of the best known. It is found over the whole of Greenland but its numbers are decreasing, as it is regularly hunted for the sake of its skin. The polar bear is from seven to eight feet long, with a narrow head, and the forehead in a line with the elongated muzzle, short ears, and long neck. It is quite white when young, changing to a creamy

POLAR BEAR

tint in maturity. Unlike most of its congeners, it is carnivorous, attacks by biting, and only pregnant females hibernate.

POLAR CIRCLES, two imaginary circles of the earth parallel to the equator, the one N. and the other S. distant 23° 28′ from either pole.

POLAR DISTANCE, the angular distance of any point on a sphere from one of its poles; more especially, the angular distance of a heavenly body from the elevated pole of the heavens. It is measured by the intercepted arc of the circle passing through it and through the pole, or by the corresponding angle at the center of the sphere. According as the N. or S. pole is elevated we have the "north polar distance" or the "south polar distance."

POLAR FORCES, in physics, forces that are developed and act in pairs with opposite tendencies, as in magnetism, electricity, etc.

POLARITY, in physics, the disposition in a body, or an elementary molecule, to place its mathematical axis in a particular direction. Also, the disposition in a body to exhibit opposite or contrasted properties or powers in opposite or contrasted directions, specifically the existence of two points, called poles, possessing contrary tendencies. Examples, attraction and repulsion at the opposite ends of a magnet, opposite tendencies in polarized light, etc. In biology Prof. Edward Forbes, considering that the relation between the palæozoic and neozoic life assemblages is one of development in opposite directions, called it polarity.

POLARIZATION, the act of polarizing or of giving polarity to, the state of being polarized. In galvanism, the production of a secondary current in a galvanic battery contrary to the principal one, owing to the gradual chemical change in the elements of the battery. This change weakens or may even destroy, the original current. Many forms of battery recover by rest; in others ingenious means are devised to avoid polarization, and such are called constant batteries.

Polarization of Light.—In optics, a state into which the ethereal undulations which cause the sensation of light are brought under certain conditions. The most familiar and simple form is that of plane polarization. This may be produced in various ways, the piece of apparatus producing such modifications, being called a polarizer. When produced, however, the effects can only be perceived by examining them through another piece of apparatus which used alone, would polarize the light, but when used to examine light already polarized, is called the analyzer. The two in combination, with the necessary adjustments, form a polariscope, of which there are many forms.

Plane Polarization.—When a ray of common light passes through a crystal (not of the cubic system), the atoms being so arranged that the elasticity (or other properties affecting motions of the ether within the crystal) are different in different directions, the ether motions are at once resolved into that of the greatest and the least elasticity at right angles to the path of the ray, so dividing the ray of common light into two "plane polarized" rays, polarized in planes at right angles to each other. One of these rays being easily eliminated by total reflection in the Nicol prism, two such prisms form a convenient polariscope. The ray, after passing through the first prism, appears just like common light, only of half the original brilliancy; but on looking at it through the second Nicol, on turning the latter round, we find two positions in which the light from the first Nicol gets through the second unaltered; and two positions at right angles to the former in which it is absolutely stopped, and the second prism, though clear as glass, is absolutely opaque to it. The beam of light appears thus to have acquired sides, and to behave differently according to the relation these sides bear to the position of the prism. Such is the fundamental nature and phenomenon of polarized light. Light is also polarized by reflection from polished transparent surfaces, when incident at such an angle

that the reflected and refracted rays make a right angle. In glass, this angle is about 56°.

Chromatic Polarization.—Let the perpendicular vibrations from a Nicol prism encounter in their path a crystalline film of selenite or mica, whose planes of greatest and least elasticity are arranged diagonally. The perpendicular vibrations are again "resolved" into two sets, one of which is retarded behind the other owing to the difference in the two elasticities. The analyzer "resolves" each of these again, bringing half of each set back into one plane. The two sets of waves are then in a position to exercise interference, and the consequence is that, if the plate or film is of suitable thickness, the most gorgeous colors are presented. It is the same with every substance having different elasticities in different directions, and as all "structure" presents such differences, polarized light becomes the most powerful weapon of the biologist, revealing structure where ordinary light will not do so.

Circular Polarization.—If two rectangular, equal impulses are given to a pendulum, or to a stretched cord, one of them a quarter-vibration later than the other, the two are compounded into a single circular orbit. Therefore, if a beam of plane-polarized light passes, as in the last paragraph, through a film of mica of such a thickness that one of the two diagonally vibrating sets of waves shall be retarded, while in the film one quarter-vibration behind the other, the two are compounded on emergence into one beam of circularly polarized light. At approximate thicknesses, the light is elliptically polarized. Circularly polarized light is never stopped by the analyzer, but differs from common light in producing polarized effects. The most important of these are:

Rotatory Polarization.—Vary the former experiment by passing the light from the polarizing Nicol, with its vibrations in a vertical plane, through a plate of selenite or mica which gives fine color; the vibrations are then in the two diagonals. Let this light now traverse a "quarter-wave" mica film, with its polarizing planes perpendicular and horizontal. Each set of rays from the first plate becomes circularly polarized, but the two are in opposite directions, the circular movements thus opposing each other. Whenever two circular notions thus meet, as in two circular pendulums clashing, the tangential motion is destroyed, and the pendulums would both fall back together through the center of the former orbit. It is so in this case; but as one set of rays has been retarded in the plates more than the other, the swing of the ether atoms is no longer in the original plane of vibration. If white light be employed, the many various wave lengths will obviously meet at different points, and hence rotation of the analyzer will give in succession more or less of the colors of the spectrum. If the quarter-wave film is cut in half, and its position reversed in one-half, the transition of colors will occur in opposite orders in the two halves. Rotary polarization is of the greatest practical importance.

Polarization of Heat.—The polarizing of rays of heat by reflection and by refraction.

Polarization of the Medium.—The name given by Faraday to the production of alternate layers of positive and negative electricity in the medium separating an electrified and an unelectrified body.

POLDER, in Holland and Belgium a tract of land below the level of the sea, or nearest river, which, being originally a morass or lake, has been drained and brought under cultivation.

POLDERHOEK, a village near Ypres, Belgium, which figured prominently in the fighting during the third battle of Ypres in the autumn of 1917. The British Fifth Division reached its borders during the first British attack and the 13th Brigade actually occupied it, but was driven out again by the Germans. This operation was repeated more than once during the battle. On Oct. 26 the British Fifth Division captured the Wood and Château of Polderhoek, taking 200 men who formed the garrison. The château was lost and was vainly stormed again by the Fifth Division on Nov. 6. New Zealanders again made an attempt on it in December, but it finally remained in German hands till the general advance that closed the war.

POLE, in astronomy, one of the two points in which the axis of the earth is supposed to meet the sphere of the heavens; one of the fixed points about which the stars appear to revolve.

POLE, MAGNETIC. See MAGNETISM.

POLE, PERCH, or **ROD**, a measure of length containing 16½ feet or 5½ yards. Sometimes the term is used as a superficial measure, a square pole denoting 5½ × 5½ yards, or 30¼ square yards.

POLE, REGINALD, CARDINAL, a British statesman, and Archbishop of Canterbury in the reign of Queen Mary, descended from the blood royal of England; born in Stourton Castle, in Staffordshire, in 1500. He was educated at

Sheen Monastery and Magdalen College, Oxford; and after obtaining preferment in the Church, went to Italy, where he long resided. On his return to England he so strongly opposed the divorce of Henry VIII. from Catherine of Aragon, that the king drove him from his presence, and never saw him more. He again left England, was made a cardinal in December, 1536, and had the offer of the popedom on the death of Paul III. Henry put to death his mother, and other members of his family, for corresponding with him. He found protection at Rome, was employed as nuncio, and was named president of the Council of Trent. When Mary ascended the throne, Pole returned to England as legate, in which capacity he absolved the Parliament from their sin of heresy, and reconciled the nation to the Holy See. The day after the burn- of Cranmer, the cardinal was consecrated Archbishop of Canterbury; later he was elected chancellor of Oxford and Cambridge, and died Nov. 18, 1558.

Major. There is no corresponding star in the Southern Hemisphere. The pole star is a convenient one for observing to determine the latitude and also the azimuthal error of any transit instrument.

POLIANTHES, a genus of *Hemerocallex;* the peduncle is two or three feet long, and has on its summit many cream colored flowers. *P. tuberosa* (tuberose), a native of Mexico and South America, much cultivated in gardens in India, China, and Java, is deliciously fragrant, especially after dark, and during some thunderstorms its fading flowers emit electric sparks.

POLICE, a system of judicial and executive administration of a country, especially concerned with the maintenance of the quiet and good order of society; the means or system adopted by the authorities of a government, state, or community to maintain public order and liberty, and

POLECAT

POLECAT, the *putorius fœtidus*, one of the Mustelinæ, akin to the marten, but with a broader head, a blunter snout, and a much shorter tail. The shorter hairs are yellow and woolly, the longer ones black or brownish black and shining. Two glands near the root of the tail emit a highly offensive smell. It makes immense havoc in poultry yards. It also devours many eggs.

POLEMICS, the art or practice of controversy or disputation; controversy; controversial writings, especially on matters of divinity or theology.

POLE STAR, Polaris, a bright star at the tip of the tail of Ursa Minor, and in a line with the pointers Merak and Dubhe, the two stars constituting the front of the plowlike figure in Ursa

to protect property. In a more limited sense, the administration of the laws, by-laws, and regulations of a city.

Also properly an abbreviation of the term police force.

POLICE MATRONS, women stationed in police stations whose function it is to take charge of the women and child prisoners. The brutality of compelling women to be searched and held by men police officials first brought protest over a hundred years ago. As far back as 1822 Elizabeth Fry, and the Society for the Improvement of Prisons, demanded that women should have charge of female prisoners arrested by the police, and gradually police matrons became an institution all over the country. Portland, Me., has the honor of having been the first municipality to install matrons in

the city jails, in 1876. The National Prison Congress, held in 1886, made the necessity of police matrons the subject of a strong recommendation, which was immediately followed by a great number of American municipalities. At the present time practically all cities and towns in this country have adopted the practice.

POLICY, a document containing a promise to pay a certain sum of money on the occurrence of some event. In return for this promise a sum of money is paid down, called the premium. By far the largest part of insurance business is applied to disasters at sea; to destruction of property by fire; to making provision for heirs and successors in case of death, and to loss of time and expense through accident. Marine policies are of two kinds: (1) Valued policy, one in which the goods or property insured are at a specified value. (2) Open policy, one in which the value of the goods or property is not mentioned. In England a ticket or warrant for money in the public funds. Wager policies, wagering policies; policies containing the phrase, "interest or no interest," intended to signify insurance of property when no property is on board the ship. They are not recognized in law.

POLIGNAC, an ancient French family, which claims to derive its name from a castle—the ancient Apolliniacum—in the department of Haute-Loire, and which since the 9th century possessed the district of Velay. Among its most famous members was CARDINAL MELCHIOR DE POLIGNAC (1661–1742), who received a cardinal's hat after acting as plenipotentiary of Louis XIV. at the peace of Utrecht (1712). From 1725 till 1732 he was French minister at the court of Rome, and he was appointed Archbishop of Auch. Polignac succeeded Bossuet at the French Academy in 1704, and left unfinished the "Anti-Lucretius" (1745), a poem intended for a refutation of Lucretius.

In the reign of Louis XVI. Iolanthe-Martine Gabrielle de Polastron, Duchesse de Polignac (born 1749; died in Vienna, Dec. 9, 1793), and her husband, Jules Duc de Polignac (died in St. Petersburg, 1817), grand nephew of the cardinal, were among the worst advisers of Marie Antoinette. They obtained vast sums of the public money from their royal master and mistress. The Polignacs knew how they were hated, and were the first of the *noblesse* to emigrate. From the Empress Catharine of Russia the duke received an estate in the Ukraine, and did not return to France at the Restoration. His son, AUGUSTE JULES ARMAND MARIE, Prince de Polignac, was born in Versailles, May 14, 1780. On the Restoration he returned to France; became intimate with the Comte d'Artois, afterward Charles X.; from his devotion to the policy of Rome received from the Pope in 1820 the title prince; was appointed ambassador at the English court in 1823; and finally, in 1829, became head of the last Bourbon ministry, in which capacity he promulgated the fatal ordonnances that cost Charles X. his throne. He then attempted to flee, but was captured at Granville on Aug. 15, was tried, and condemned to imprisonment for life in the castle of Ham, but was set at liberty by the amnesty of 1836. He took up his residence in England, but died in St. Germain, March 2, 1847. His son, Prince Armand (1817–1890), was a leading monarchist.

POLIOMYELITIS, INFANTILE PARALYSIS, an acute disease manifesting itself in inflammation of the gray matter of the spinal cord. It is not a disease to which adults are liable, except in rare cases, and in one of its forms it attacks the anterior horns of the spinal cord with resultant paralysis, and debilitation of certain muscles. It is now conceded that many of the great plagues mentioned in history have taken the form of acute poliomyelitis, but the disease was first diagnosed and revealed in its epidemic character during its prevalence in Scandinavia midway in the last century. Since that time modern research has made headway in discovering its causes and elaborating safeguards and correct treatment, the Rockefeller Institute taking a leading part in these investigations.

It is only within the last dozen years or so that it was revealed that acute anterior poliomyelitis was capable of being communicated. The filterable but invisible virus has been located in various membranes and secretions of the human body, but its presence there has not as yet been clearly accounted for. Its admission into the body is considered, in the present state of knowledge, to be in the main through the upper respiratory canals leading to the cerebrospinal fluid. The preliminary symptoms include bronchitis and intestinal maladies, with aches, fever, and perspiration, followed by paralysis in the parts attached. The paralysis is usually permanent and no remedy has yet been found for the condition of atrophy which follows. Where the paralysis affects a vital organ the malady is fatal.

Rest is a prime requisite in the treatment of the disease, but this must be

varied at proper intervals with massage and auxiliary movement of the affected limb. The further methods in vogue include the removal of the cerebrospinal fluid, followed by injection of the virus serum. This treatment is supplemented by calisthenics directed to bringing life and movement into the dormant parts. Where the malady affects an adult the course is similar but more severe, and calls for similar treatment, but is more likely to end in death.

POLITICAL ECONOMY, the science which investigates the nature of wealth and the laws of its production and distribution, including, directly or remotely, the operation of all the causes by which the condition of mankind, or of any society of human beings, in respect to this universal object of human desire, is made prosperous or the reverse. Inquiries on these points must have existed from the earliest times in every nation, but political economy as a science is very modern. Crude views on the subject arose in the Middle Ages in the free Italian cities and the Hanseatic towns. Sir Walter Raleigh (1595), Sir William Petty (1667), and Sir Dudley North (1691) wrote on the subject with enlightenment for their age. François Quesnay, in France (1786), founded the school of the economists which held that the soil is the source of all wealth. Adam Smith (1723–1790) had made political economy a portion of his lectures while professor in Glasgow University from 1751 to 1764. Visiting Paris in that year, he became acquainted with Quesnay and the leading economists, but the principles of his great work, the "Wealth of Nations," published after 10 years' retirement, in 1776, were in the main, thought out independently. Since Adam Smith's time, no work on the subject has appeared more original or influential than the "Principles of Political Economy," by John Stuart Mill. Probably the most notable political economist of the latter part of the century was Henry George, of New York City, whose views, to some extent, coincide with those of J. S. Mill, especially as regards the unearned increment of the land. Mr. George's theory has been popularly denominated the single tax idea, and is best set forth in his work, "Progress and Poverty." The most important corollary of the single tax is unlimited free trade —these two principles forming, in fact, all of Mr. George's theory. See SINGLE TAX.

POLITICAL PARTIES, division of people in a State marked off by the particular views they hold as to the public policy to be pursued in the best interests of the people at large.

POLITICAL SCIENCE, the study which treats of the life, organization, and principles of the state. Its primary purpose is to investigate and trace the history of the various political institutions of the state, showing what useful purposes they serve, the interests which called them into being, and attempting to show how they may be modified to suit changing social conditions. In serving these purposes the need is now felt of having a wide range of historical data in order that vague generalizations may be avoided, and also artificial constructions. The latter has been the particular purpose of the science in the period preceding the rise of historical criticism in the nineteenth century. The method of study now used is the comparative one, an extensive examination and criticism of the existing institutions in many different modern states and a deduction of principles from the facts gathered. Still another purpose of the science, and one which is not nor ever can be fully achieved, is the derivation of sound principles for the conduct of political life. As the nature of the subject is certainly not wholly mathematical, but dependent in great measure on the complex psychology of human beings, until more accuracy is possible in this latter field, sound principles in political science will not be laid down very dogmatically.

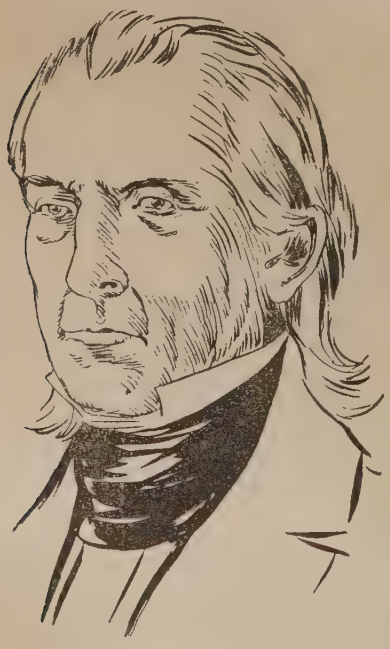
Like many of the sciences the complex nature of society and the increasing amount of data at the disposal of modern scholars has brought about many subdivisions of political science. Among the divisions earliest to be made was the setting apart of the study of political theory and ethics from that of the field of constitutional and administrative law. A later division has created international law and diplomacy as subjects apart from comparative study of party politics and legislation.

Aristotle's "Politics" is among the first works on political science, and in the field of political theory holds its own against many later treatises. A long space of time elapses before we come to another work which at all ranks with it, not in fact until Jean Bodin, a Frenchman of the 16th century. In the 17th century Hobbes and Locke contributed to the literature of the subject, their elaborate theories revolving around the "social contract." Montesquieu and Rousseau are the leading political theorists of the eighteenth century. In the philosophy of Kant and especially of Hegel is found a considerable amount of political theory interwoven with their general

philosophies. The other branches of the science enumerated above, such as the study of administrative law and comparative legislation, did not receive a full measure of attention until the 19th century, but since then have tended to attract a considerable number of scholars. Among contemporary American writers on political science may be mentioned in the first ranks Burgess and Dunning, abroad Bosanquet and Bluntschli.

POLK, FRANK LYON, an American public official. Born in New York City, 1871, and graduated from Yale University in 1894. Began the practice of law in New York City in 1897 and later served on the Civil Service Commission. In 1915 he was appointed counsellor for the Department of State, and after President Wilson's and Secretary Lansing's departure from Paris in 1919, he represented the United States at the gathering of the Powers. He resigned his post in June, 1920.

POLK, JAMES KNOX, an American statesman, 11th President of the United States; born in Mecklenburg co., N. C.,



JAMES K. POLK

Nov. 2, 1795. His ancestors, who bore the name of Pollock, emigrated from the W. of Ireland early in the 18th century. He was educated at the University of Nashville, Tenn., and was admitted to the bar in 1820. In 1823 he was sent to the Tennessee Legislature, and in 1824 to Congress, to which body he was reelected for seven successive terms, serving till 1839. He was made chairman of the Committee of Ways and Means in 1833, and twice elected Speaker of the House—1835–1837. In Congress he was consistently a Democrat, supporting unwaveringly the administrations of Jackson and Van Buren, and opposing that of Adams. In 1839 he was elected Governor of Tennessee, and in 1844 unexpectedly nominated as a compromise candidate of the National Democratic Convention for the presidency, and elected over Henry Clay, the Whig candidate. His administration was eventful, and in some respects brilliant. Texas was annexed, and the Mexican War fought which, with territorial purchases, added the great territory now comprising Texas, California, New Mexico, Utah, Nevada, and the W. part of Colorado to the domain of the United States. The Oregon boundary forming one of the issues on which he was elected, was settled by a compromise offered by England. He was a man of eminent administrative abilities, of consistent principles and pure and upright private character. At the close of his single term Polk declined to stand for renomination, and retired to private life in Nashville, Tenn., where he died June 15, 1849.

POLK, LEONIDAS, an American military officer; born in Raleigh, N. C., April 10, 1806; was a cousin of President Polk. Graduating at the United States Military Academy in 1827, he received a commission in the artillery, but was induced to study for the ministry, and in 1838 was consecrated Bishop of Arkansas and Indian Territory, with charge of the dioceses of Alabama, Mississippi, and Louisiana. In 1841 he resigned all these except the bishopric of Louisiana, which he retained till his death. Soon after the outbreak of the Civil War he was offered a major-generalship by Jefferson Davis, and, accepting it, proceeded to strongly fortify strategical points on the Mississippi. At Belmont, in November, 1861, he was driven from his camp by Grant, but returned and compelled him to retire. At Shiloh and at Corinth he commanded the 1st Corps; in October, 1862, he was promoted to Lieutenant-General and in November he conducted the retreat from Kentucky. After Chickamauga, where he commanded the right wing, he was relieved of his command; but in December, 1863, he was appointed to the Department of Alabama, Mississippi, and Eastern Louisiana, and he afterward joined Johnston in op-

posing Sherman's march to Atlanta. He was killed while reconnoitering on Pine Mountain, June 14, 1864.

POLKA, a well known dance, the music to which is in ⅔ time, with the third quaver accented. There are three steps in each bar, the fourth beat is always a rest, the three steps performed on the three first beats of every bar.

POLLACK, *Gadus pollachius*, a common fish on British coasts, belonging to the cod, haddock, and whiting genus. It is about the size of the coal-fish, is active in habit, and is frequently caught. The lower jaw projects beyond the upper, and there is no barbel. In Scotland and in some parts of Ireland it is called lythe.

POLLAN, or **POWAN**, *Coregonus pollan*, from the Irish Lakes, somewhat resembling a herring (*Clupea harengus*), but with a remarkably short head and deep body.

POLLARD, the name given to a tree the head of which has been lopped off about 8 or 10 feet from the ground, in order to induce it to send out bushy shoots, which are cut periodically for basket making, fuel, fencing, or other purposes.

POLLARD, ALBERT FREDERIC, an English historian and writer; born in 1869, and educated at Oxford University. From January, 1893, until 1901 he was the assistant editor of the "Dictionary of National Biography," serving at the same time on the faculties of Victoria University, Manchester, and in Cambridge University. In 1916 he became Creighton Lecturer in the University of London, a position which he now holds. His best known historical work is his "Reign of Henry VII.," from contemporary sources, 3 volumes, published in 1913.

POLLEN, in botany, the pulverulent or other substance which fills the cells of the ANTHER (*q. v.*). It consists of minute granules varying in size and inclosing a fluid containing molecular matter. It is the male element in a plant, corresponding to the seminal fluid in animals, and is designed to fertilize the seed. In entomology, pollen collected from plants and carried on the outer surface of the tibiæ of bees. Mixed with honey, it becomes the food of the larvæ.

POLLIO, CAIUS ASINIUS, a Roman soldier; born in Rome, 76 B. C.. He sided with Cæsar in the civil war fought at Pharsalia, and commanded in Spain against Sextus Pompeius, but was defeated. He sided with the triumvirs against the oligarchic senate, and was appointed by Antony to settle the veterans on the lands assigned them in Transpadane Gaul. It was now that he saved the property of the poet Vergil at Mantua from confiscation. After Antony and Octavian had quarreled, it was Pollio who effected their temporary reconciliation at Brundusium (40). This year he was consul, when Vergil's fourth eclogue was addressed to him. The year after he went to Greece as legate of Antony, and defeated the Parthini, a people of Illyria. This was the period of Vergil's eighth eclogue, also addressed to Pollio. Thereafter he withdrew altogether from political life, and survived till A. D. 4. Pollio was the first to establish a public library at Rome, and was the patron of Vergil, Horace, and other poets. His own orations, tragedies and history have perished.

POLLOCK, an illustrious family descended from David Pollock, saddler to George III. in the later part of the 18th century, who kept a shop near Charing Cross. Three of his sons rose to eminence—SIR DAVID POLLOCK, chief justice of Bombay (died 1847); SIR FREDERICK POLLOCK; and field-marshal SIR GEORGE POLLOCK. The second, FREDERICK, was born Sept. 23, 1783, and in 1802 passed from St. Paul's School to Trinity College, Cambridge, where in 1806 he graduated B. A. as senior wrangler and was elected a fellow of his college, and called to the bar at the Middle Temple. Was attorney-general in 1834–1835 and 1841–1844; and in the last year succeeded Lord Abinger as Chief Baron of the Exchequer. He had been knighted in 1834, and on his retirement in 1866 he received a baronetcy. He died Aug. 23, 1870. His eldest son, SIR FREDERICK POLLOCK, born April 3, 1815, was educated at Trinity College, Cambridge (1832–1836), and in 1838 was called to the bar at the Inner Temple. He was appointed a master of the Court of Exchequer (1846), and Queen's Remembrancer (1874); in 1876 became senior master of the Supreme Court of Judicature; in 1886 resigned his offices. Besides a good many magazine articles, he published a blank verse translation of Dante (1854), and two pleasant volumes of "Personal Remembrances" (1887). He died Dec. 24, 1888. His oldest son, also SIR FREDERICK POLLOCK, third baronet; born Dec. 10, 1845, and from Eton passed to Trinity, where in 1868 he obtained a fellowship. He was called to the bar at Lincoln's Inn in 1871, and became professor of Jurisprudence at University College, London (1882), Corpus Professor of Jurisprudence at Oxford (1883), and

Professor of Common Law (1884). Beside "Spinoza; his Life and Philosophy" (1880), he published, among other valuable legal works: "Principles of Contract" (1875); "Digest of the Law of Partnership" (1877); "Law of Torts" (1887); and "Oxford Lectures" (1891). His younger brother, WALTER HERRIES POLLOCK, born Feb. 21, 1850, and likewise educated at Eton and Trinity, was called to the bar at the Inner Temple in 1874, and 10 years later became editor of the "Saturday Review." He wrote "Lectures on French Poets," "The Picture's Secret," "Verses of Two Tongues," "A Nine Men's Morrice," "Old and New," etc. GEORGE FREDERICK POLLOCK, born in 1821, third son of the first baronet, became a master of the Supreme Court of Judicature; and the fourth son, SIR CHARLES EDWARD, born in 1823, became a baron of Exchequer and judge of the High Court.

SIR GEORGE POLLOCK, field-marshal; born in Westminster June 4, 1786, and entered the army of the East India Company as lieutenant of artillery in 1803. He engaged in active warfare, in the battle and siege of Deig in Bhartpur (1804), at the siege of Bhartpur (1805), and in other operations against Holkar. Was in the Nepal (Goorkha) campaigns of 1814–1816, and in the first Burmese War (1824–1826), winning his colonelcy. In 1838 he reached the rank of major-general. After the massacre of General Elphinstone and his forces in the passes of Afghanistan the Indian government decided to send a force to the relief of Sir Robert Sale, who was shut up in Jelalabad. The command of the relieving force was given to General Pollock. In April, 1842 (5th to 16th), he forced the Khyber Pass, and reached Sir Robert Sale; then, after a few months' delay he pushed on to Kabul to rescue the British prisoners in the hands of Akbar Khan. He defeated the Afghan chief at Tezeen and recovered 135 British prisoners. Then after being joined by the forces of General Nott, he successfully conducted the united armies back to India. He was rewarded with a G. C. B. and a political appointment at Lucknow. He returned to England in 1846, was director of the East India Company for a couple of years (1854–1856), and was created a field-marshal in 1870, and a baronet in 1872; in 1871 he was appointed to the honorable office of constable of the Tower. He died Oct. 6, 1872, and was buried in Westminster Abbey.

POLL TAX, a tax levied per head in proportion to the rank or fortune of the individual; a capitation tax. This tax was first levied in England in 1377 and 1380, to defray the expenses of the French War; its collection in 1381 led to the insurrection of Wat Tyler. In the United States a poll tax (varying from 25 cents to $3 annually) is levied in some of the States, in addition to the taxes on property. In some States its payment is a necessary prerequisite for voting.

POLLUX, a celebrated hero of the Grecian mythology, and twin brother of Castor, after whose death he implored Jupiter to render him immortal. His prayer could not be entirely granted, but Jupiter divided immortality between the brothers, each living and dying alternately. In astronomy, one of the twins forming the constellation Gemini. Also the name of a star of the second magnitude in the same constellation. In mineralogy, a hydrated silicate of alumina, potash, and soda, remarkable for containing 34 per cent. of cæsium. It is a rare mineral.

POLO, an equestrian game, which may be shortly described as hockey on horseback. It is of Oriental origin and of high antiquity; indeed, it has been claimed that it can be traced back to 600 B. C. Polo was first played by Europeans in 1863 in Calcutta. Almost the same game exists in Tibet; while native equestrian games more or less closely resembling polo are played in Japan and other parts of the East. Since 1871 many polo clubs have been started in Great Britain and, since 1876, in the United States, as well as wherever Britons are found in the East. The principal British club which makes the rules of the game, is at Hurlingham, near London.

POLO, MARCO, a Venetian traveler of the 13th century, the son of a merchant, who, with his brother, had penetrated to the court of Kublai, the great khan of the Tartars. This prince, being highly entertained with their account of Europe, made them his ambassadors to the Pope; on which they traveled back to Rome, and with two missionaries, once more visited Tartary, accompanied by the young Marco, who became a great favorite with the khan. Having acquired the different dialects of Tartary, he was employed on various embassies; and after a residence of 17 years, all the three Venetians returned to their own country in 1295, with immense wealth. Marco afterward served his country at sea against the Genoese, and, being taken prisoner, remained many years in confinement, where he wrote his "Travels." An English trans-

lation of the "Travels of Marco Polo" was published by William Marsden, the Orientalist, in 1817 and it has often been reprinted.

POLONAISE, a Polish national dance, which has been imitated, but with much variation, by other nations. The polonaise, in music, is a movement of three crotchets in a bar, characterized by a seeming irregularity of rhythm, produced by the syncopation of the last note in a bar with the first note of the bar following, in the upper part or melody, while the normal time is preserved in the bass.

POLTAVA, or **PULTAWA**, a province of Russia, bounded by Czernigov, Kharkov, Ekaterinoslav, Kherson, and Kiev; area 19,265 square miles; pop. about 4,000,000. It is one of the most fertile and best cultivated portions of the Russian empire, and grows large quantities of grain. Live stock and bee rearing are important branches of the rural economy. Both manufactures and trade are of very limited extent. Poltava, the capital, at the confluence of the Poltava with the Worskla, has straight and broad streets, a cathedral, etc. As a place of trade Poltava derives importance from the great fair held each year. Wool is the great staple of trade. Horses, cattle, and sheep are likewise bought and sold in great numbers. It contains a monument to Peter the Great, who here defeated Charles XII. in 1709. Pop. about 85,000.

POLYANDRY, the marriage of one woman to several men at once. The custom is still widely spread in the East. Cæsar found it in Britain on his arrival. Tacitus has been cited as an authority that the ancient Germans practiced polyandry.

POLYANTHUS, a beautiful and favorite variety of the common primrose (*Primula vulgaris*), a native of most parts of Europe, growing in woods and copses in a moist clayey soil.

POLYBASIC ACIDS, acids which possess more than one hydrogen atom capable of being replaced by a metal equivalent.

POLYBIUS, a Greek historian; born in Megalopolis, Greece, probably about 204 B. C. He was the son of Lycortas, who succeeded Philopœmen as general of the Achæan League, and he profited both by the example and instructions of Philopœmen. In the funeral procession of the latter from Messene to Megalopolis, Polybius bore the urn containing the ashes of his friend. He was one of the 1,000 Achæans carried to Italy in 168, on the charge of not having assisted the Romans against Perseus. He lived in the house of Æmilius Paulus, and became the intimate friend of his son Scipio; returned with his fellow exiles to Greece, in 151; accompanied Scipio to the siege of Carthage. His great work is a general history of the affairs of Greece and Rome from 220 B. C. to 146 B. C., the epoch of the fall of Corinth, prefaced by a summary view of early Roman history. Five only of its 40 books are now extant, with some fragments of the rest, but these are among the most important literary remains of antiquity. He died at the age of 82.

POLYCARP, ST., one of the apostolical fathers of the Church, and a Christian martyr who, according to tradition, was a disciple of the Apostle John, and by him appointed Bishop of Smyrna. He made many converts, enjoyed the friendship of Ignatius, and opposed the heresies of Marcion and Valentinus; but during the persecution of the Christians under Marcus Aurelius he suffered martyrdom wtih the most heroic fortitude, A. D. 166. His short "Epistle to the Philippians" is the only one of his writings that has been preserved.

POLYCHROMY, the art of coloring statuary to imitate nature, or particular buildings in harmonious, prismatic, or compound tints.

POLYCOTYLEDONOUS PLANTS, those plants of which the embryos have more than two cotyledons or seed lobes.

POLYCRATES, a ruler of the island of Samos from about 536 to 522 B. C. He conquered several islands on the Asiatic mainland, waged war successfully against the inhabitants of Miletus, and defeated their allies, the Lesbians, in a great sea fight. His intimate alliance with Amasis, King of Egypt, proves the importance in which this daring island-prince was held even by great monarchs. According to Herodotus, Amasis dreaded the misfortunes that the envious gods must be preparing for so lucky a mortal, and wrote a letter to Polycrates, earnestly advising him to throw away the possession that he deemed most valuable, and thereby avert the stroke of the spleenful gods. Polycrates, in compliance with this friendly advice, cast a signet-ring of marvelous workmanship into the sea, but next day a fisherman presented the tyrant with an unusually big fish and in its belly was found the identical ring. It was quite clear to Amasis now that Polycrates was a doomed man, and he immediately broke off the alliance. When Cambyses invaded Egypt (525) Polycrates sent him a contingent of 40 ships, in which he

placed all the Samians disaffected toward his tyranny, but mutinying they returned to Samos, and made war against the tyrant, but without success. Thereupon they went to Sparta, and secured the help of both Spartans and Corinthians and embarked for Samos, and besieged Samos in vain, and Polycrates became more powerful than ever. Orœtes, the Persian satrap of Sardis, had conceived a deadly hatred against Polycrates, and having enticed the latter to visit him at Magnesia, he seized and crucified him.

POLYCYSTINA, or **POLYCISTINA**, in zoölogy, a sub-order of Radiolaria, placed by Wallich in his Herpnemata.

POLYGALA, milkwort, the typical genus of *Polygalaceæ*. Flowers irregular. Two inner sepals wing-shaped and petaloid; stamens combined by their claws with the filaments, the lower one keeled. Ovary two-celled, two-seeded, seeds downy, crested at the hilum. Known species 200, from temperate and tropical countries. Three are British. An infusion of *P. rubella*, a native of North America, very bitter, is used in small doses as a tonic and stimulant, and in larger ones as a diaphoretic. The American *P. senega* is snake root. *P. chamæbuxus* from Europe, *P. sanguinea* and *P. purpurea* from North America, *P. paniculata* from the West Indies, *P. serpentaria* from the Cape, and *P. crotalarioides* from the Himalayas, are emetic, purgative, and diuretic. *P. poaya* from Brazil, *P. glandulosa*, and *P. scoparia* from Mexico, are emetic. *P. thesioides*, from Chile, is diuretic. *P. tinctoria*, from Arabia, is there used in dyeing, and the Javanese *P. venenosa* is poisonous.

POLYGAMY, the practice or condition of having a plurality of wives or husbands at the same time. It is commonly applied to polygyny, but, strictly speaking, it should include polyandry as well. It is forbidden by law in all Christian countries, but existed among the Mormons. See MORMONS.

POLYGLOT, a collection of versions in different languages of the same work, but is almost exclusively applied to manifold versions of the Bible. The Hexapla of Origen contained, besides the Hebrew text, several other Greek versions, but is not commonly reckoned among the polyglots. Of modern works of this kind the most convenient is Bagster's Polyglot, first published by Bagster at London in 1831, which gives the Old Testament in eight languages (Hebrew, Greek, Latin, English, German, Italian, French, and Spanish), and the New Testament in nine (the Syriac version being added).

POLYGON, in geometry, a portion of a plane bounded on all sides by more than four limited straight lines. These lines are called sides of the polygon, and the points in which they meet are called vertices of the polygon. Polygons are classified according to the number of their sides or angles. Polygons having all their sides equal are called equilateral; those having all their angles equal are called equiangular. Polygons which are both equilateral and equiangular are called regular polygons. Similar polygons are to one another as the squares of their homologous sides. In fortification, the exterior polygon is the figure formed by lines connecting the angles of the bastion round the work. The interior polygon is the figure formed by lines connecting the centers of the bastions all round.

POLYGONACEÆ, buckwheats; an order of hypogynous exogens, alliance Silenales. Herbs, rarely shrubs. Distribution, world wide. Known genera 29, species 490. (Lindley.)

POLYGYNIA, an order in Linnæus' artifical classification, containing plants with many pistils.

POLYHYMNIA, one of the Muses, daughter of Jupiter and Mnemosyne, who presided over singing and rhetoric, and was deemed the inventress of harmony.

POLYMORPHISM, the property possessed by certain bodies of crystallizing in two or more forms not derivable one from the other.

POLYNESIA, a general name for a number of distinct archipelagoes of small islands scattered over the Pacific Ocean, extending from about lat. 35° N. to 35° S., and from lon. 135° E. to 100° W., the Philippines, New Guinea, Australia, and New Zealand being excluded. The islands are distributed into numerous groups, having a general direction from N. W. to S. E. The groups of the equator are the Pelew, Ladrone or Marianne, Caroline, Marshall, Gilbert or Kingsmill, Fanning, and Hawaii or the Sandwich Islands. S. of the equator are New Ireland, New Britain, Solomon Islands, New Hebrides, Fiji, New Caledonia, Navigator, Friendly, Cook's or Harvey, and the Society Islands, the Low Archipelago, the Marquesas Islands, and the isolated Easter Island. The term Polynesia is sometimes restricted to the groups most centrally situated in the Pacific; the New Hebrides, Solomon Islands, New Britain, New Ireland (Bismarck Archi-

pelago), etc., being classed together as Melanesia, whereas the Carolines, Ladrones, Marshall Islands, etc., form Micronesia. The islands may be divided into two chief classes, volcanic and coral islands. Some of the former rise to a great height, the highest peak in the Pacific, Mauna Loa, in Hawaii, reaching 13,600 feet. The principal groups of these are the Friendly, the Sandwich, the Marquesas, and the Navigator Islands. The coral islands comprise the Carolines, Gilbert, and Marshall Islands on the N. W., and the Society Islands and Low Archipelago in the S. E.

Polynesia has a comparatively moderate temperature, and the climate is delightful and salubrious. The predominating race, occupying the central and E. portion of Polynesia, is of Malay origin, with oval faces, wide nostrils, and large ears. Their language is split up into numerous dialects. The other leading race is of negroid or Papuan origin, with negro-like features and crisp mop-like hair. They are confined to Western Polynesia, and speak numerous distinct dialects. Christianity has been introduced into a great many of the islands, and a large number of them are under the control of one or other of the European powers. The commercial products consist chiefly of cocoanuts, cotton, coffee, sugar, fruits, pearls, and trepang. The Ladrones were discovered by Magellan in 1521, the Marquesas by Mandaña in 1595, but it was not till 1767 that Wallis, and subsequently Cook, explored and described the chief islands. Since the natives came in contact with the whites their numbers have greatly decreased.

POLYP, a name usually applied to an animal like the fresh-water hydra or like the sea anemone, having a tubular body and a wreath of many tentacles around the mouth. The name is equally applicable to an isolated individual or to a member (zooid or "person") of a colony. Thus, the individuals which make up a zoöphyte or a coral colony are called polyps, and the term is seldom used except in reference to cœlentrate animals.

POLYPHEMUS, in mythology, the king of all the Cyclops in Sicily, and son of Neptune and Thoosa. He is represented as a monster of immense strength, and with one eye in the middle of the forehead. He fed on human flesh, and kept his flocks on the coasts of Sicily, when Ulysses, at his return from the Trojan War, was driven there.

POLYPHONE, a musical instrument of the music-box type, used principally in connection with the graphophone. Also a character or vocal sign which represents more than one sound.

POLYPHONIC, having, or consisting of many sounds or voices. In music, consisting of several tone series or parts, progressing simultaneously according to the rules of counterpoint; contrapuntal.

POLYPLECTRON, or **POLYPLECTRUM**, in music, a musical instrument in which the tones were produced by the friction of numerous slips of leather acting on strings, and moved by pressing or striking keys, as in the pianoforte.

In ornithology, a genus of *Phasianinæ*, from the Oriental region. Bill rather slender, sides compressed, tip curved, nostrils lateral; longitudinal opening partly hidden by a membrane. Wings rounded, tail long, rounded. Tarsi long, those of the male with two or more spurs. Toes long and slender. There are five species.

POLYPODIACEÆ, in botany, ferns proper; an order of acrogens, alliance Filicales. Known genera 183, species 2,000.

POLYPUS, a morbid growth attached to the interior of any of the mucous canals. It is generally a fleshy tumor with many branches. Polypi sometimes grow in the nose, larynx, heart, rectum, uterus and vagina. In zoölogy, in the plural, a class of radiated animals defined as having many prehensile organs radiating from around the mouth only.

POLYTECHNIC INSTITUTE, an educational non-sectarian institute in Brooklyn, N. Y.; founded in 1854; reported at the close of 1919: Professors and instructors, 45; students, 981; president F. W. Atkinson, Ph. D.

POLYTECHNIC SCHOOL, an educational establishment in which instruction is given in many arts and sciences, more especially with reference to their practical application. The first polytechnic school was established by a decree of the French Convention, on Feb. 13, 1794, and was of great service to the country. Numerous schools of this class now exist in all parts of the United States, among them the Brooklyn Polytechnic, Drexel Institute in Philadelphia, etc.

POLYTHALAMIA, a group of Protozoa occupying compound chambered cells of microscopic size.

POLYTHEISM, the worship of many gods. It is not necessarily the same as idolatry, for gods may be adored without any image of them being made. In Sir John Lubbock's classification of religious beliefs, fetishism and totemism are polytheistic; the next stage in the

ascending order, anthropomorphism, may or may not be so. Though some of the Greek and Roman philosophers may have risen above polytheism to conceive the unity of God, the masses of the people were polytheistic, as is the case with the ethnic nations today, though in some cases, as in that of India, pantheism underlies polytheism, and some apparent polytheists really believe all nature to be one God.

POMACEÆ, Linnæus, 37th natural order, including Punica Pyeus, Ribes; also appleworts, an order of perigynous exogens, alliance Rosales. Trees or shrubs, with alternate, stipulate leaves; flowers solitary, or in terminal cymes, white or pink. Found in the temperate parts of the Northern Hemisphere. Known genera 16, species 200. (Lindley.)

POMADE, perfumed or fragrant ointment or composition for dressing the hair; pomatum.

POMBAL, SEBASTIAN JOSEPH DE CARVALHO E MELLO, MARQUIS OF, a Portuguese statesman; born May 13, 1699, at the castle of Soure, near Coimbra. In 1739 he was appointed ambassador in London, and six years later was sent to Vienna in a similar capacity. Just before Joseph I. ascended the throne of Portugal (1750), Pombal was appointed secretary for foreign affairs and Prime Minister in 1756. He crushed a revolt instigated by the great nobles and the Jesuits, and in 1759 banished the latter from the kingdom. Then he abolished slavery in Portugal, set himself to establish good elementary schools, and published a new code of laws. He effected the reorganization of the army, the establishment of an East India Company, and another for Brazil. The tyranny of the Inquisition was broken. Agriculture, commerce, and the finances were all improved. In 1770 he was created Marquis of Pambal. On the accession of Joseph's daughter, Maria I. (in 1771), who was under the clerical influence, Pombal was deprived of his offices and banished from court, while many of his institutions were abolished. He died in his castle of Pombal, May 8, 1782.

POMEGRANATE, the fruit of *Punica granatum*. The seeds have a pellucid pulpy covering, and are eaten.

POMEGRANATE TREE, *Punica granatum*, once believed to be the type of a distinct order. A tree 15 to 25 feet high, a native of W. Asia and N. Africa. It forms woods in Persia. A decoction of the bark is a powerful anthelmintic, but not so good as fern root; the flowers are tonic and astringent; the bark of the fruit is used in leucorrhœa, chronic dysentery, etc., and the acrid juice in bilious fevers. The plant is sometimes used for hedges. Its bark is of use in tanning.

POMERANIA, a province of Prussia, bounded by the Baltic, Mecklenburg, Brandenburg, and West Prussia; area, 11,630 square miles; pop. about 1,800,000. The chief islands along the coast are Rügen, Usedom, and Wollin. The interior is flat and, in parts, marshy. The principal rivers are the Oder, Persante, and Stolpe. The soil is generally sandy and indifferent, but there are rich alluvial tracts, producing a quantity of grain. Flax, hemp, and tobacco are also cultivated. The forests are of large extent. There are few minerals. Manufactures include woolen and other fabrics. A considerable general and transit trade is carried on. The center of trade is Stettin, which ranks as one of the chief commercial cities of Prussia. Pomerania appears to have been originally inhabited by Goths, Vandals, and Slavs. The present inhabitants are of Saxon stock. The first mention of it in history is in 1140. It long remained an independent duchy, and in 1637, on the extinction of the ducal family, it was annexed to Sweden. On the death of Charles XII. it was ceded to the electoral house of Brandenburg, with the exception of a part which subsequently was also obtained by Prussia.

POMERENE, ATLEE, United States Senator from Ohio, born in 1863 in Ohio, he graduated from Princeton in the class of '84. After completing a law course at the Cincinnati Law School he was admitted to the bar in 1886 and began the practice of law at Canton, Ohio. In 1897 he was elected prosecuting attorney of Stark co. on the Democratic ticket and in 1910 was chosen lieutenant-governor of Ohio. The following spring he was chosen United States Senator and re-elected in 1917.

POMONA, the Roman divinity of the fruit (*pomum*) of trees. She was beloved by several of the rustic divinities, as Sylvanus, Picus, and Vertumnus. Varro tells us that at Rome the worship of Pomona was under the care of a special priest, the *flamen Pomonalis*. In works of art she was generally represented with fruits in her lap, or in a basket, with a garland of fruits in her hair, and a pruning knife in her right hand.

POMONA, the largest and most populous of the Orkney Islands; length from N. W. to S. E., 23 miles; extreme

breadth, about 15 miles, but at the town of Kirkwall only about 2½ miles; area, 150 square miles. Pop. 17,165. The surface is covered in great part by moor and heath, but good pasture is also to be found and in the valleys a good loamy soil occurs. The principal towns are Kirkwall and Stromness.

POMONA, a city of California, the county seat of Los Angeles co. It is on the Southern Pacific and the San Pedro, Los Angeles and Salt Lake railroads. Its attractive situation and healthful climate make it a popular health resort. It is the center of an important fruit-growing region. Pomona College is in the neighborhood. It has a handsome park and a public library. Pop. (1910) 10,207; (1920) 13,505.

POMPADOUR, JEANNE ANTOINETTE POISSON, MARQUISE DE, the mistress of Louis XV., in whose affections she succeeded Madame de Châteauroux; the daughter of a financier;

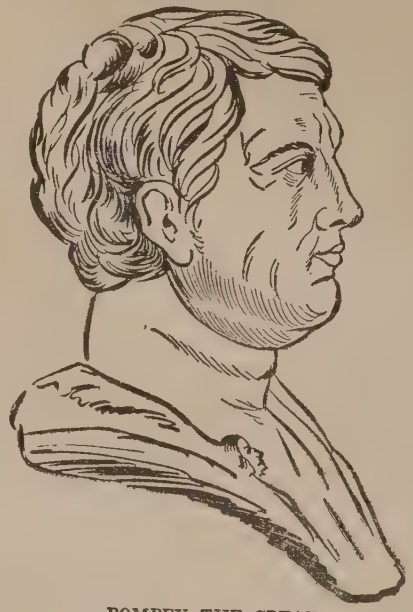
MARQUISE DE POMPADOUR

born in 1720. At the age of 21 she was married to M. d'Etioles; first attracted the king's notice while he was hunting in the forest of Senart; appeared at court in 1745, under the title of Marquise de Pompadour. She certainly used her influence with the king in promoting the progress of the fine arts, but her cupidity and extravagance were unbounded; and many of the evils which oppressed France in the succeeding reign have been attributed to her. She died in 1764.

POMPEII, a seaport at the mouth of the Sarnus, on the Neapolitan Riviera, founded about 600 B. C. by the Oscans, and after them, occupied by the Tyrrheno-Pelasgians, and by the Samnites, till these, about 80 B. C., were dispossessed by the Romans. From that time down to its destruction, A. D. 79, it became (with Herculaneum) a watering place for the wealthy, frequented by the aristocracy, if not by Caligula and Nero, in whose honor it erected triumphal arches. On Feb. 5, A. D. 63, by an earthquake in the vicinity, all the palatial buildings were wrecked, and years elapsed ere the fugitive citizens recovered confidence enough to reoccupy and rebuild what was once Pompeii. Tawdriness replaced simplicity of decoration —the columns, capitals, and cornices being ornamented with reliefs in stucco picked out with parti-colored designs, while private houses, fantastically restored and adorned, infringed every artistic or æsthetic canon to favor the grotesque style of the Decadence. Revolutionized as it was for the worse, the city, however, retained a good deal of Greek character and coloring, and had relapsed into more than its former gayety and licentiousness, when on Aug. 23 (or, more probably, on Nov. 23) 79, with a return of the shocks of earthquake, Vesuvius was seen to throw up a column of black smoke, ashes, pumice, and red-hot stones, settling down on the doomed cities with a force increased by the rain-torrents that intermittently fell. The panic of the citizens was aggravated by repeated shocks of earthquake and for three days the flight continued till Pompeii was abandoned by all who could effect their escape. By the fourth day the sun had partially reappeared, as if shining through a fog, and the more courageous of the citizens began to return for such of their property as they could disinter. The desolation and distress were such that the reigning emperor Titus organized relief on an imperial scale. This attempt was soon abandoned, and Pompeii remained a heap of hardened mud and ashes, gradually overgrown with grass till 1592, when the architect Fontana, in cutting an aqueduct, came on some ancient buildings. But only in 1748, under the Bourbon Charles III., were they recognized as part of Pompeii. Unsystematic, unscientific excavations proceeded fitfully till 1860, when the Italian kingdom took in hand the unearthing of the city. This was carried out with admirable ingenuity, care, and success—all treasure trove being vigilantly preserved till now Pompeii possesses a distinction unknown to it in the zenith of its imperial favor, and attracts the pil-

grim from every clime. Pompeii as now exposed formed an irregular ellipse, extending from E. to W., in circumference about 2,843 yards; it had eight gates. Its most important part—not quite one-half, including the Forum, adjacent temples, and public buildings, two theaters with colonnades, amphitheater, and many private houses—has already been exhumed, and five main streets made out. The streets, which are straight and narrow—the broader 24 feet wide, the narrower 14 feet only—are admirably paved with polygonal blocks of lava. The street corners are provided with fountains, ornamented usually with the head of a god or a mask. Notices painted in red letters, and referring to municipal elections for which some particular candidate is recommended, occur frequently on the street walls, while trade-signs are few and far between. An occasional "phallus," to avert the evil eye, projects from over a doorway, and, much more common, one or two large snakes, emblems of the Lares, are to be seen. The stuccoed walls, to judge from the *Graffiti* or roughly scratched drawings on them, were as tempting to the Pompeian gamin, as to our own. House construction consists mainly of concrete (rubble held together by cement) or brick, and sometimes of stone blocks, especially at the corners. Two-storied, sometimes three-storied houses are numerous, though the upper floors, built of wood, have been consumed by the eruption. Shops usually occupied the ground floors of dwelling-houses, on their street aspect, let out to merchants or dealers as at the present day, but not connected with the back part of the house. They could be separated from the street by large wooden doors, while inside they had tables covered with marble, in which earthen vessels for wine or oil were inserted. The shopkeeper had sometimes a second room at the back, when he did not live on an upper floor or in another part of the town. Only a personal visit can convey an idea of the indoor life of the Pompeians, among whom the absence of glass, the fewness of the openings in the street aspect of the house wall, and the protection of these with iron gratings are among the points noted by the most casual visitor. The feature that most strikes the Northerner being the smallness of the rooms, particularly the bedrooms—quite intelligible, however, when he realizes that the Pompeians led an open-air life, and performed their toilets at the bath, public or private. As rebuilt after 63, Pompeii shows little marble, the columns being of tufa or brick cemented by mortar. A coating of stucco was laid over wall or column, and presented an ample field for ornamental painting. This must have given to Pompeii its bright, gay coloring. On the center of the interior walls is generally seen a painting unconnected with the others—often of a nymph, or a genius, when not distinctly erotic in theme—typifying faithfully the voluptuous sensual life of this pleasure-haunt of paganism.

POMPEY, CNEIUS POMPEIUS MAGNUS, son of Pompeius Strabo, a Roman general; born in 106 B. C. He distinguished himself against the enemies of the Roman senate, both within the state and without, and at last fell in the struggle against Cæsar for absolute power. Like his father, serving against Marius, Pompey ranged himself with the aristocratic party of the republic. He was in his 23d year only when he raised three complete legions, 60,000 men, at his own expense, and took the field in behalf of Sylla. By his 26th year Pompey had defeated the remains of the Marian party in Cisalpine Gaul, Sicily,



POMPEY THE GREAT

and Africa, and on his return to Rome, 83 B. C., was hailed *Magnus*—the great—by Sylla. On the death of Sylla, in 78 B. C., Pompey went as proconsul to Spain, where the plebeian war was continued by Sertorius, and after a four years' arduous struggle, he remained master of the field, his opponent having been betrayed and assassinated. He returned to Italy in time to give the fin-

ishing blow to the similar victories of Crassus, and in 70 B. C. Pompey and Crassus were elected consuls. In the year 67 B. C., he destroyed the lawless bands infesting the coasts of the Mediterranean; was made absolute dictator in the East, and superseded Lucullus in the command against Mithridates. The latter he completely routed in 66 B. C., and becoming master of Asia Minor, pursued his conquests through Syria and Palestine as far as the Red Sea. In 60 B. C. he joined Cæsar and Crassus in the triumvirate, the former of whom gave him his daughter Julia in marriage. Succeeding events caused Pompey to draw closer to the senatorial party, and with him, as the representative of the patrician republic, went Cato, the honest enemy of the ambition of Cæsar. In 54 B. C. Julia died; in the year following, Crassus was slain in Asia; and now the hostility between Cæsar and Pompey rapidly developed itself. The former having applied for the consulship, refused to present himself in Rome as a private citizen, and a decree of the senate declared him a public enemy unless he resigned his command. Instead of doing so, Cæsar crossed the Rubicon with his troops, 49 B. C., and Pompey, accompanied by Cato, Cicero, and other nobles of Rome, fell back on Greece, where the great battle of Pharsalia decided his fate. Pompey was advised to seek an asylum in Egypt, then ruled by a sovereign he had protected, Ptolemy XIV. He was received with pretended friendship, but treacherously murdered as soon as he had stepped ashore, 48 B. C., and his head being cut off, it was sent to Cæsar, who turned away from it and could not restrain his tears. Pompey fell, and with him the republic of Rome. CNEIUS, son of Pompey, who endeavored to carry on the war against Cæsar, was defeated and killed at Munda, 45 B. C. SEXTUS, the younger brother of Cneius, continued the war for 10 years, and rendered himself formidable as a naval commander; but he was at last defeated and killed by order of Antony, 35 B. C.

PONCE, second largest city in the thickly populated island of Porto Rico. It is in the middle of the south coast, has no harbor, but only an open roadstead, and is connected with San Juan, directly opposite on the north coast, by a military highway, a splendid result of old-fashioned Spanish engineering. Pop. (1920) 41,561. It was the principal commercial city of the island before the conquest by America, being the ordinary port of call for Spanish ships. In 1918 the island suffered from two earthquakes that made 600 families homeless.

PONCE DE LEON, JUAN, the discoverer of Florida; born in San Servas, Spain, in 1460, served against the Moors, and in 1502 sailed with Ovando to Hispaniola, and became governor of the E. part of the island. In 1510 he obtained the government of Porto Rico, and had conquered the whole island by 1512, when he was deprived of his post. He then, broken in health, set out on a quest for the fountain of perpetual youth, and on March 27, 1513, found Florida, landing a little to the N. of where St. Augustine now stands. After staying on his way back to drive the Caribs out of Porto Rico, he returned in 1521 to conquer his new subjects; in this, however, he failed. He retired to Cuba, and died there in July from the wound of a poisoned arrow.

PONDICHERRY, the chief of the French settlements in India; on the Coromandel coast; 53 miles S. W. of Madras city; is divided into two parts by a canal, White (European) town being next the sea. It has handsome streets, a government house, a college, a lighthouse, and cotton mills, besides native dyeing establishments. Pop. (1917) 47,321. Exports chiefly oil seeds. The French colony of Pondicherry has an area of 115 square miles. Pop. (1917) 166,793. The governor of Pondicherry is governor-general of the French possessions in India. The French first settled here in 1674. The Dutch took the town in 1693, but restored it to the French in 1697. In 1748 Admiral Boscawen besieged Pondicherry for two months, but was compelled to raise the siege. Eyre Coote, however, took it in 1763. It was once more taken by the English under Sir Hector Monro in 1778, and once more given back in 1783. In 1793 the English again repossessed themselves of it, but it was a third time restored to the French in 1816.

PONIATOWSKI, JOSEPH, PRINCE, a Polish general; born in Warsaw, Poland, in 1763, and when young entered the Austrian service, but when the Poles rose against Russia he quitted it, and joining his countrymen, fought with them under Kosciusko. On the defeat of this general, Poniatowski sought refuge in Vienna, till the French entered Warsaw in 1806, when he was appointed to the command of the Polish army which was to co-operate with the French against Russia. In 1812 Napoleon gave him the command of the 5th Corps of the Grand Army, which consisted almost entirely of Poles. In the subsequent battles he distinguished himself. Napoleon estimated his services so highly, that he created him a Marshal of France.

After the French defeat at Leipsic Poniatowski escaping with others, was drowned while attempting to cross the River Elster, Oct. 13, 1813.

PONT-À-MOUSSON, a town of France, department of Meurthe-et-Moselle; on the Moselle, 18 miles N. N. W. of Nancy and 18 S. S. E. of Metz. There is a fine Gothic church of the 13th century dedicated to St. Martin. The former abbey of St. Mary is now a seminary. The town was the birthplace of Marshal Duroc, the friend of Napoleon. Pop. about 15,000. Was the scene of heavy fighting in the World War (1914-1918).

PONTCHARTRAIN, LAKE, in Louisiana, about 5 miles N. of New Orleans, is 40 miles long and 25 wide. It is navigated by small steamers, and communicates with the Gulf of Mexico. The drainage of New Orleans is carried into the lake through canals.

PONTEFRACT, or **POMFRET**, a market-town in the West Riding of Yorkshire, England; on an eminence near the influx of the Calder to the Aire, 13 miles S. E. of Leeds. It stands on the line of a Roman road, but seems to have arisen round its Norman castle, which, founded about 1076 by Ilbert de Lacy, was the scene of the execution or murder of the Earl of Lancaster (1322), Richard II. (1400), and Earl Rivers (1483), was taken in the Pilgrimage of Grace (1536), and during the Great Rebellion sustained four sieges, being finally dismantled in 1649, after its capture by Lambert. There are two old churches, a town hall (rebuilt 1796), a market hall (1860), a grammar school of Edward VI. (1549), and large market gardens and nurseries, the growing of liquorice for the lozenges called "Pomfret cakes" being a specialty as old as about 1562.

PONTIAC, a city of Michigan, the county-seat of Oakland co. It is on the Clinton river, and on the Grand Trunk and the Pontiac, Oxford, and Northern railroads. It is situated in the midst of a picturesque lake region and is noted for its hunting and fishing. It has a large trade in wool, fruit, and farm produce, and its industries include the manufacture of automobiles, wagons, farm machinery, paints and varnishes, foundry products, flour, etc. It is the seat of the State Hospital for the Insane. It has a public library and other public buildings. Pop. (1910) 14,532; (1920) 34,273.

PONTIAC, a celebrated Indian chief of the Ottawa tribe; born about 1712. He was the leader in Pontiac's War, and was killed in Illinois in 1769.

PONTIAC'S WAR, an Indian war of 1763 between the English settlers and garrisons on the frontiers, and a combination of the Delawares, Wyandots, Shawnees, Mingoes, Chippewas, and other Indian tribes, under the leadership of Pontiac. The war lasted two years and was marked by ferocious and bloody battles in which some garrisons were completely annihilated. An unsuccessful attack was made on Detroit in 1763.

PONTIFEX, a bridge builder; a title given to the more illustrious members of the Roman colleges of priests. Their number was originally five, the president being styled Pontifex Maximus. The number was afterward increased to nine, and later still to 15. It is now the title of the Pope.

PONTIGNY, a village of the French department of Yonne, 10 miles N. E. of Auxerre, with a famous Cistercian monastery, dating from the 12th century. It was the burial place of St. Edmund of Canterbury. Here Thomas Becket found refuge in 1164–1166; as did Stephen Langton in the next century. The monastery was devastated by the Huguenots in 1567, and finally destroyed at the Revolution; but the church (mainly 1150–1170) is the most perfect Cistercian church in existence.

PONTINE MARSHES, an extensive marshy tract of land in Italy, in the S. part of the Roman Campagna, extending along the shores of the Mediterranean for about 24 miles, with a mean breadth of 7 miles. The Romans, by the construction of the Appian way and by means of canals, made a considerable part of them dry, and many of the Popes, especially Pope Pius VI., engaged in the drainage and reclaiming of the marshes.

PONTOON, a floating vessel supporting the roadway timbers of a floating military bridge. They may be boats, water-tight cylinders of tin, or wooden frames covered with canvas, india-rubber, etc. Also, a barge or lighter of large capacity, used in careening ships, raising weights, drawing piles, etc., or capable, in pairs, of acting as camels. And a barge or flat-bottomed vessel furnished with cranes, capstans, and hoisting tackle, used in wrecking, in connection with a diving bell, or in raising submerged vessels. In hydraulic engineering, a water-tight structure which is sunk by filling with water, and raised by pumping it out, used to close a sluiceway or entrance to a dock. It works in grooves in the dock walls, and acts as a lock gate.

PONTRESINA, a tourist center in the Swiss canton of Grisons, stands in the Upper Engadine, on the road connecting with the Bernina Pass, and is much frequented by Alpine climbers.

PONTUS, in ancient geography, the N. E. province of Asia Minor, bounded N. by the Euxine Sea, W. by Galatia and Paphlagonia, S. by Cappadocia and part of Armenia, and E. by Cholchis. It was originally governed by kings, and was in its most flourishing state under Mithridates the Great. The geographer Strabo was born in Amasia, its capital; and one of its principal towns, Trapezus, still flourishes under the name of Trebizond.

PONTUS EUXINUS. See BLACK SEA.

PONY, a term applied to several subvarieties or races of horses, generally of smaller size than the ordinary horses, and which are bred in large flocks and herds in various parts of the world, chiefly for purposes of riding and of lighter draught work. Among well-known breeds are the Welsh, Shetland, Iceland, Exmoor, New Forest, and Scotch Highland.

POODLE, a breed of dog whose origin dates from the beginning of the 17th century or earlier. The poodle varies considerably in his appearance, and attempts have been made to divide the breed into several sections, such as the large and small variety, or the corded coated and fleecy coated variety, as also into black Russian and white German poodles; but none of these divisions are very clearly defined. The large black Russian poodle is much the most handsome and agile specimen of the race, and may be easily trained to retrieve. The small white poodle is only fit for a house dog, but is extremely clever. For some unknown reason the poodle has always been clipped in a peculiar manner; with the exception of a few tufts, his body and hindquarters are entirely bare, while the coat on his shoulders is left long.

POOL, a game played on a pool table. The pool table is constructed exactly the same as a billiard table, excepting the fact that it has four or six apertures in the rails, through one of which it is necessary to drive a ball to make a count, the ball so driven being propelled from the force imparted by being struck by the cue ball. A pyramid of 15 balls is placed at a given spot on the table and the game is ended, if there are but two players, when eight balls are pocketed, as that is a majority of the 15 object balls. Variations in this game have been introduced.

Also, an arrangement between several competing lines of railway, by which the total receipts of each company are pooled, and distributed *pro rata* according to agreement. A combination of persons contributing money to be used for the purpose of increasing or depressing the market price of stocks, with a view to the settlement of differences. Also the stock or money contributed by a clique to carry through a corner. Also, a gambling enterprise participated in by several persons; the joint stake or fund contributed by such persons. In rifle shooting, firing for prizes on the arrangement that each competitor pays a certain sum for each shot, and all the proceeds of the day, after deduction of the necessary expenses, are divided among the winners.

POOLE, a seaport of Dorsetshire, England; 5 miles W. of Bournemouth and 30 E. of Dorchester. It stands on the N. side of Poole Harbor (7 by 4¼ miles), an irregular inlet, formed by the projection of the "isle" of Purbeck, almost dry at low water, and having four tides a day. On Brownsea or Branksea Island, just within the narrow entrance to the harbor, is a castle, dating from the time of Henry VIII. Poole itself has an old town hall (1572), a guildhall (1761), a town house (1822), considerable shipping, some yacht building, and a large trade in potter's and pipe clay. The men of Poole were great fighters, as buccaneers, smugglers, and Cromwellian soldiery.

POOLE, JOHN, an English playwright; born in 1792; wrote the immortal "Paul Pry," first produced at the Haymarket in 1825, and several other farces and comedies, such as "Turning the Tables," "Deaf as a Post," "'Twould Puzzle a Conjuror," "The Wife's Stratagem," etc. Besides these theatrical pieces he wrote also the satirical "Little Pedlington" (1839), "The Comic Sketch Book" (1859), "Comic Miscellany" (1845), "Christmas Festivities" (1845). He died in London, Feb. 5, 1879.

POONA, or **PUNA**, a town of British India, 119 miles S. E. of Bombay; the military capital of the Deccan. The city is surrounded by gardens, but its streets are mostly narrow or crooked, and the houses poor. The ruins of the peshwa's palace, burned in 1827, still remain. Under the peshwas the city was the capital of the Mahratta princes and power; it was occupied and annexed by the British in 1818. Here have been built the Deccan College and the College of Science, the latter for training civil engineers. The Europeans live chiefly

at the cantonments, N. W. of the city. The natives manufacture cottons and silks, gold and silver jewelry, ivory and glass ornaments, and clay figures. Pop. about 160,000. The district has an area of 5,348 square miles. Pop. about 1,000,000.

POON WOOD, the wood of the poon tree (*Calophyllum inophyllum* and *Calophyllum angustifolium*), a native of India. It is of a light, porous texture and is much used in the East Indies in shipbuilding for planks and spars. The Calcutta poon is preferred to that of other districts. Poon seed yields an oil called *dilo*, poon-seed oil, etc.

POORE, BENJAMIN PERLEY, an American author; born in Newbury, Mass., Nov. 2, 1820; spent several years abroad, and devoted much time to research in French history. On his return he became active in journalism, and for 30 years was Washington correspondent of the "Boston Journal." His works include "The Rise and Fall of Louis Philippe" (1848); "Early Life of Napoleon" (1851); "Reminiscences of Sixty Years" (1886). He died in Washington, D. C., May 30, 1887.

POORE, HENRY RANKIN, an American artist; born in Newark, N. J., 1859, and graduated from the University of Pennsylvania in 1883. His first pictures were combinations of figures and animal subjects, but his later work has been devoted to landscape pictures, mostly of New England scenes. Among his most celebrated works are "Hounds in Winter" (1898); "Pilgrim Sons" (1915). He is the author of a valuable book for students of art entitled "Pictorial Composition and the Critical Judgment of Pictures" (1913).

POPAYAN, capital of Cauca, Colombia, near river Cauca, 226 miles S. W. of Bogota. Buildings include university, city hall, cathedral and ecclesiastical seminaries. Seat of archbishopric. Formerly a gold mining center, but now has few industries, including sheep raising, wool and blanket manufactures. Pop. about 20,000.

POPE, a bishop of the Christian Church; specifically, the Bishop of Rome. The term Papa, or Papas (father), has always been given by the Greek Church to presbyters, like the term Father now applied to a Roman priest. In the early centuries the bishops received the same title till, in a council held at Rome in 1076, at the instance of Gregory VII. (Hildebrand), it was limited to the Bishop of Rome. Holding that office, being also Metropolitan of Rome and primate, and claiming to be the earthly head of the Church universal, it is in the last named capacity that the term Pope is held to be specially applicable. It has been a matter of controversy among Roman Catholics whether the authority of the Pope was above or below that of the General Council. That of Pisa (1409), claiming to be a General Council, deposed two rival Popes, and appointed a third; but the two former repudiated the authority of the council, and exercised their functions as before. The Council of Constance (1414–1418) also deposed two rival Popes and elected one. In 751 Pope Zachary being consulted as to the right of the warlike French to depose their incompetent king, Childeric, and raise Pepin, the able mayor of the palace, to the sovereignty, sanctioned the proceeding. Pepin, in return, became his friend, and handed over to the Church the Exarchate and the Pentapolis. Charlemagne, in 774, confirmed and enlarged the gift. In 1076 or 1077 the Princess Matilda, daughter of Boniface, Duke of Tuscany, made the Holy See heir to her extensive possessions. Thus arose "the States of the Church" which figured on the map of Europe as an independent sovereignty till Sept. 20, 1870, when the troops of Victor Emmanuel, King of Italy, entered Rome, nominally in the interests of order, and took possession of the palace for the Italian kingdom. On July 2 and 3, 1871, the seat of government was removed thither. It still continues the metropolis. No interference took place with the Pope's purely spiritual authority, but much with his temporal possessions and revenues.

A Papal Election.—When the death of the reigning Pope is imminent the Dean of the College of Cardinals summons his colleagues to the residence of the dying pontiff. Prayers are ordered in all the Roman churches. Immediately after the death of the Pope the cardinal camerlingo knocks thrice on the door of the bed chamber where the body lies. Getting no answer, he enters and with a silver mallet taps thrice on the forehead of the dead man, calling him three times by name. The announcement of the Pope's death is then publicly made and the cardinal camerlingo takes an inventory of the property in the palace and seals up the dead pontiff's papers. Nine days is the official period of mourning. On the ninth day the remains, which have been lying in state in St. Peter's, are accorded a magnificent public funeral and are placed in the temporary receiving tomb, there to remain till the next Pope dies, when they are interred in the

crypt of St. Peter's. Then all is ready for the conclave which meets to elect a new Pope.

The cardinals from all over the world gather in the palace, and to preserve secrecy, the quarters occupied by them are isolated, every door, window, and other aperture, being walled up. After attending the mass of the Holy Ghost, the cardinals march in solemn and splendid procession to the chapel, from which at the ringing of a bell all but the cardinals are ejected. Then the great doors are locked on the outside and from that time on the conclave has no ostensible connection with the outside world. Two dumb waiters in which the food for the cardinals is delivered are the only means of communication. About 10 o'clock of the second morning the cardinals proceed to the Sistine Chapel, if the conclave is to be held in the Vatican, and the balloting begins. Three cardinals are chosen to count the ballots and three to collect the ballots of those whom sickness detains in their cells. On the upper part of the ballot each cardinal writes his own name, below it the name of his candidate, and at the bottom some verse of Scripture. The ballots are then folded and sealed, so that only the name of the candidate voted for is in sight.

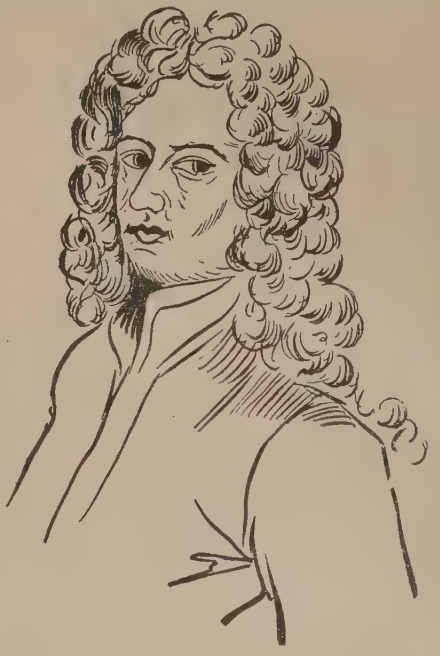
There are three methods of election recognized—by inspiration, by compromise, and by election. The first is when all the cardinals, as if moved by one spirit, proclaim one candidate as Pope unanimously and viva voce. The second is when a committee is appointed to decide on a compromise between rival candidates. The third and usual method is when balloting is continued till some candidate is successful. It is not necessary that a cardinal or even a member of the priesthood be chosen as Pope. In fact, at least two laymen, John XIX. (1024) and Adrian V. (1276) have been elected Pope. Two ballots a day are taken till one candidate receives two-thirds of all the votes. Then the successful candidate is adorned with the pontifical robes, and the Sacred College performs the first act of homage to the new sovereign. Then the masons tear down the wall which has stopped up one of the balcony windows and the cardinal dean announces the election to the waiting multitude. Then follows various public ceremonies, and finally—most impressive and splendid of all—the coronation of the new Pope. The papal insignia are the tiara or triple crown, the straight crosier, and the pallium. The Pope should be addressed as "Your holiness."

The following is a table of the Popes, according to the Roman "Notizie," with the dates of the commencement of their pontificates. The names printed in italics are those of anti-Popes:

St. Peter .....A. D.	42
St. Linus	66
St. Anacletus	78
St. Clement I....	91
St. Evaristus	100
St. Alexander I...	108
St. Sixtus I.....	119
St. Telesphorus ..	127
St. Hyginus	139
St. Pius I.....	142
St. Anicetus	157
St. Soterus	168
St. Eleutherius ..	177
St. Victor I.....	193
St. Zephirinus ...	202
St. Callixtus I....	217
St. Urban I.....	223
St. Pontianus ...	230
St. Anterus	235
St. Fabian	236
St. Cornelius	250
St. Lucius I.—*Novatianus*	252
St. Stephen I.....	253
St. Sixtus II.....	257
St. Dionysius	259
St. Felix I.....	269
St. Eutychianus ..	275
St. Caius	283
St. Marcellinus ..	296
(See vacant 3 years and 6 months.)	
St. Marcellus I...	308
St. Eusebius	310
St. Melchiades or Miltiades	311
St. Sylvester I....	314
St. Marcus	336
St. Julius I.....	337
Liberius	352
St. Felix II. (sometimes reckoned an Anti-pope)	355
St. Damasus I...	366
St. Siricius	384
St. Anastasius I...	398
St. Innocent I....	402
St. Zosimus	417
St. Boniface I.—*Eulalius*	418
St. Celestine I...	422
St. Sixtus III....	432
St. Leo I. the Great	440
St. Hilary	461
St. Simplicius ...	468
St. Felix III.....	483
St. Gelasius I....	492
St. Anastasius II..	496
St. Symmachus ..	498
St. Hormisdas—*Lawrence*	514
St. John I.....	523
St. Felix IV.....	526
Boniface II.—*Dioscorus*	530
John II.....	533
St. Agapetus I....	535
St. Sylverius	536
Vigilius	537
Pelagius I.....	555
John III.	560
Benedict (I.) Bonosus	574
Pelagius II.	578
St. Gregory I. the Great	590
Sabinianus	604
Boniface III. ...	607
St. Boniface IV...	608
St. Deusdedit ...	615
Boniface V.	619
Honorius I.	625
(See vacant 1 year and 7 months.)	
Severinus	640
John IV.	640
Theodorus I.....	642
St. Martin I.....	649
St. Eugenius I....	654
St. Vitalianus ...	657
Adeotatus	672
Donus or Domnus I.	676
St. Agathon	678
St. Leo II.	682
St. Benedict II...	684
John V.	685
Conon — *Theodorus; Paschal*...	686
St. Sergius I.....	687
John VI.....	701
John VII.	705
Sisinnius	708
Constantine	708
St. Gregory II....	715
St. Gregory III..	731
St. Zachary	741
Stephen II (died before consecration)	752
Stephen III.....	752
St. Paul I.—*Constantine; Theophylactus; Philip*	757
Stephen IV.....	768
Adrian I.....	772
St. Leo III.....	795
Stephen V.....	816
St. Paschal I.....	817
Eugenius II.....	824
Valentinus	827
Gregory IV.....	827
Sergius II.....	844
Leo IV.....	847
Benedict III.—*Anastasius*	855
St. Nicholas I...	858
Adrian II.....	867
John VIII.....	872
Marinus I., or Martin II.....	882
Adrian III.....	884
Stephen VI.....	885
Formosus	891
Boniface VI.....	896
Stephen VII.....	896
Romanus	897
Theodorus II.—*Sergius III.*.	898
John IX.....	898
Benedict IV.....	900
Leo V.....	903
Christopher	903
Sergius III.....	904
Anastasius III...	911
Lando	913
John X.....	914
Leo VI.....	928
Stephen VIII.....	929
John XI.....	931
Leo VII.....	936
Stephen IX.....	939
Marinus II., or Martin III.....	943
Agapetus II.....	946
John XII.—*Leo VIII*	956
Benedict V.....	964
John XIII.....	965
Benedict VI.....	972
Donus or Domnus II.	973
Benedict VII....	974
John XIV.—*Boniface VII*.....	983
John XV.....	985
Gregory V.—*John XVI.*	996

Sylvester II..... 999
John XVI. or XVII. 1003
John XVII. or XVIII. 1003
Sergius IV..... 1009
Benedict VIII.—*Gregory VI.*....1012
John XVIII. or XIX. 1024
Benedict IX. (deposed) — *John XX.* 1033
Gregory VI.—*Sylvester III.* 1045
Clement II.....1046
Damasus II. — *Benedict IX.* attempts to resume the throne 1048
St. Leo IX.....1049
Victor II.....1055
Stephen X.....1057
Benedict X..... 1058
Nicholas II.....1058
Alexander II.—*Honorius II.*....1061
Gregory VII. (Hildebrand) — *Clement III.*...1073
(See vacant 1 year.)
Victor III.....1086
Urban II.....1088
Paschal II.....1099
Gelasius II.—*Gregory VIII.*.....1118
Callixtus II.....1119
Honorius II.—*Celestine II.*.....1124
Innocent II.—*Anacletus II.; Victor IV.*.....1130
Celestinus II.....1143
Lucius II.....1144
Eugenius III.....1145
Anastasius IV....1153
Adrian IV. (Nicholas Breakspear, an Englishman) 1154
Alexander III.—*Victor V.; Paschal III.; Callixtus III.; Innocent III.*.....1159
Lucius III.....1181
Urban III.....1185
Gregory VIII.....1187
Clement III.....1187
Celestinus III...1191
Innocent III....1198
Honorius III....1216
Gregory IX.....1227
Celestinus IV....1241
(See vacant 1y. 7m.)
Innocent IV.....1243
Alexander IV.....1254
Urban IV.....1261
Clement IV.....1265
(See vacant 2 years and 9 months.)
Gregory X.....1271
Innocent V.....1276
Adrian V.....1276
John XIX. or XX. or XXI.....1276
Nicholas III.....1277
Martin IV.....1281
Honorius IV.....1285
Nicholas IV.....1288
(See vacant 2 years and 3 months.)
St. Celestinus V...1294
Bonifacе VIII....1294
Benedict XI.....1303
Clement V.....1305
(Seat of the Papacy removed to Avignon) 1305
(See vacant 2 years and 3 months.)
John XXII.....1316
Benedict XII.—*Nicholas V. at Rome* 1334
Clement VI.....1342
Innocent VI.....1352
Urban V. — *Clement VII.*.....1362
Gregory XI. (throne restored to Rome).....1370
Urban VI.....1378
Boniface IX. — *Benedict XIII. at Avignon*....1389
Innocent VII.....1404
Gregory XII.....1406
Alexander V.....1409
John XXIII.....1410
Martin V.—*Clement VIII.*.....1417
Eugenius IV.—*Felix V.*.....1431
Nicholas V.....1447
Callixtus III.....1455
Pius II.....1458
Paul II.....1464
Sixtus IV.....1471
Innocent VIII....1484
Alexander VI.....1492
Pius III.....1503
Julius II.....1503
Leo X.....1513
Adrian VI.....1522
Clement VII.....1523
Paul III.....1534
Julius III.....1550
Marcellus II.....1555
Paul IV.....1555
Pius IV.....1559
St. Pius V.....1566
Gregory XIII.....1572
Sixtus V.....1585
Urban VII.....1590
Gregory XIV.....1590
Innocent IX.....1591
Clement VIII.....1592
Leo XI.....1605
Paul V.....1605
Gregory XV.....1621
Urban VIII.....1623
Innocent X.....1644
Alexander VII....1655
Clement IX.....1667
Clement X.....1670
Innocent XI.....1676
Alexander VIII...1689
Innocent XII.....1691
Clement XI.....1700
Innocent XIII....1721
Benedict XIII....1724
Clement XII.....1730
Benedict XIV....1740
Clement XIII.....1758
Clement XIV.....1769
Pius VI.....1775
Pius VII.....1800
Leo XII.....1823
Pius VIII.....1829
Gregory XVI.....1831
Pius IX.....1846
Leo XIII.....1878
Pius X.....1903
Benedict XV.....1914
Pius XI....1922

POPE, ALEXANDER, an English poet; born in London, May 21, 1688. His father was a devout Catholic. Pope was small, delicate, and much deformed. His education was a desultory one. He picked up the rudiments of Greek and Latin from the family priest, and was successively sent to two schools, one at Twyford, the other in London. He was taken home at the age of 12. Before he was 15 he attempted an epic poem, and at the age of 16 his "Pastorals" procured him notice. In 1711 he published his poem the "Essay on Criticism," which was followed by "The Rape of the Lock," a polished and witty narrative poem founded on an incident of fashionable life. His next publications were "The Temple of Fame," a modernization and adaptation of Chaucer's "House of Fame"; "Windsor Forest," a pastoral poem (1713); and "The Epistle of Eloisa to Abelard" (1717). From 1713 to 1726 he was engaged on a poetical translation of Homer's works, the "Iliad" (completed in 1720) being wholly from his pen, the "Odyssey" only half. The pecuniary re-



ALEXANDER POPE

sults of these translations showed a total profit of nearly $45,000. In 1728 he published his "Dunciad," a mock heroic poem intended to overwhelm his antagonists with ridicule. This was followed by "Imitations of Horace" and by "Moral Epistles" or "Essays." His "Essay on Man" was published anonymously in 1733, and completed and avowed by the author in the next year. In 1742 he

added a fourth book to his "Dunciad." Pope was vain and irascible, and seems to have been equally open to flattery and prone to resentment; yet he was kind-hearted and stanch to his friends, among whom he reckoned Swift, Arbuthnot, and Gay. His great weakness was a disposition to artifice to acquire reputation and applause. As a poet, no English writer has carried further correctness of versification. A large number of his letters were published in his own lifetime. He died in Twickenham, May 30, 1744.

POPE, JOHN, an American military officer; born in Louisville, Ky., March 16, 1822; was graduated at the United States Military Academy in 1842, and entered the engineers. He served in Florida (1842–1844), and in the Mexican War, and was brevetted captain for gallantry. He was afterward employed in exploring and surveying in the West, till the outbreak of the Civil War, when he was appointed Brigadier-General of volunteers. In 1861 he drove the guerrillas out of Missouri; in 1862 he captured New Madrid in March, and was made Major-General, commanded the Army of the Mississippi in the operations against Corinth, and was assigned to the command of the Army of Virginia, with the rank of Brigadier-General, U. S. A. For 15 days in August he faced Lee, but was defeated at the second battle of Bull Run, on the 29th and 30th. He then requested to be relieved, and was transferred to Minnesota, where he kept the Indians in check. He held various commands till 1886, when he retired. In 1882 he became Major-General, U. S. A. Pope died in Sandusky, O., Sept. 23, 1892.

POPERINGHE, a town in West Flanders, Belgium, near the French frontier, 6 miles W. S. W. of Ypres. It has an ancient wall and mediæval church, and its industries include the gathering of hops and the making of cloths. The town as a result of the World War was largely reduced to ruins, being the scene, along with Ypres, of some of the bloodiest fighting in the war. Pop. about 12,000.

POPINJAY, a parrot; a figure of a bird put up as a mark for archers to shoot at ("papingo" being another Scotch form for this sense). The green woodpecker is also sometimes called popinjay. Also derisive term for a fop.

POPISH PLOT, in English history, an alleged plot made known by Titus Oates in 1678. He asserted that two men had been told off to assassinate Charles II., that certain Roman Catholics whom he named had been appointed to all the high offices of the State, and that the extirpation of Protestantism was intended. On the strength of his allegation, various persons, including Viscount Stafford, were executed. Gradually evidence arose that the whole story was a fabrication. On May 8, 1685, Oates, who had received a pension of $10,000 for his revelations, was convicted of perjury, heavily fined, pilloried, and publicly flogged. He survived, making several attempts to exploit new plots, but deservedly despised. Died in 1705.

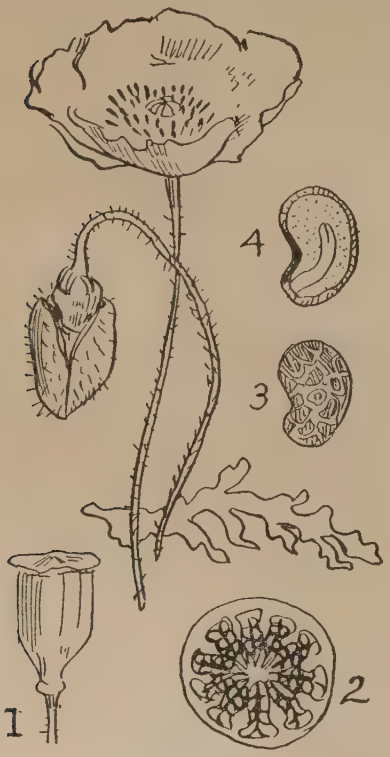
POPLAR, a genus of *Salicaceæ*. Catkins drooping, their scales usually jagged; disk cup-shaped, oblique, entire. Males, stamens 4 to 30; females, stigmas, two to four-cleft; capsule two-celled, loculicidal. Known species 18, from the N. temperate zone. Two, *Populas alba*, the great white poplar or abele, and *P. tremula*, the trembling poplar or aspen, are indigenous. *P. nigra*, the black poplar, is only naturalized. The first is a large tree with downy, but not viscous buds. It grows in moist places and mountain woods. The timber is white, soft, and used only for coarse work. The bark is said to be useful in strangury. For the second species, see ASPEN. *P. nigra* has viscid buds, leaves rhombic deltoid, or suborbicular. It grows in moist places, on river banks, etc. The wood is light, and not very valuable. It is used for carving, or burnt for charcoal, and the bark employed for tannin. *P. monilifera* is the black Italian poplar, *P. fastigiata*, the Lombardy poplar, and *P. canadensis*, the Canadian poplar. The buds of *P. nigra*, the Himalayan *P. balsamifera*, *P. candicans*, etc., are besmeared in winter with a resinous balsamic, bitter, aromatic exudation, called tacamahac, considered to be diuretic, and antiscorbutic. The bark of *P. euphratica* is given in India as a vermifuge. The poplar occurs in the Cretaceous rocks of North America, the Eocene of Bournemouth, and the Miocene of Continental Europe.

POPLIN, a silk and worsted stuff, watered, figured, brocaded, or tissued. Originally an all-silk French goods. Irish poplins have a silk warp and worsted weft, and in the common grades cotton or flax is mixed with the silk.

POPOCATEPETL ("smoking mountain"), a volcano about 40 miles S. E. of the City of Mexico. It rises in the form of a cone to the height of 17,784 feet above the sea-level. No eruption has been recorded since 1540; it still smokes, however. It is often scaled and in and around its crater (5,165 feet in diameter,

and nearly 1,000 deep) a good deal of sulphur is obtained.

POPPY, a genus of plants of the natural order *Papaveraceæ*, having a calyx of two (or rarely three) sepals, which very soon fall off; a corolla of four (rarely six) petals; numerous stamens seated on a receptacle; the



POPPY

1. Ripe Capsule
2. Section
3. Seed
4. Section

stigma crowning the ovary, without a style, and in the form of 4 to 20 rays. There are numerous species of poppy, mostly natives of Europe and Asia, some of them found even in very N. regions, but most of them in the warmer, temperate parts. They are herbaceous plants, annual, biennial, or perennial, mostly sprinkled with bristly hairs. They have a white milky juice; a disagreeable narcotic smell, particularly when bruised; and large showy flowers, which readily become double by cultivation. The capsules are curious from the manner in which they fling out their seeds when the plant is shaken by the wind; each capsule being somewhat like a round or oval pepper box, with holes, however, not in the top, where rain might get in by them, but under the projecting rim. By far the most important species is that known as the opium poppy. (*P. somniferum*), also called the white poppy and the oil poppy. But the same species is important on account of the bland fixed oil of the seeds, and is much cultivated as an oil plant. Poppy oil is as sweet as olive oil, and is used for similar purposes. It is imported into Great Britain and the United States in considerable quantities from India. The poppy is also extensively cultivated for it in France, Belgium, and Germany. The oil expressed from it is perfectly wholesome, and is much used in France and elsewhere as an article of food. The seeds yield about 40 per cent. of oil, and the oil cake is useful for manure or for feeding cattle. The oil is sometimes used by painters and by soap boilers; but it is not good for burning.

The variety of poppy chiefly cultivated as an oil plant has flowers of a dull reddish color, large oblong capsules, and brownish seeds; but the white-flowered variety, with globular capsules and white seeds, is also used. The Oriental poppy (*P. orientale*), a native of Armenia and the Caucasus, a perennial species, is often planted in gardens on account of its very large, fiery-red flowers. Its unripe capsules have an acrid, almost burning taste, but are eaten by the Turks, and opium is extracted from them. A variety with double flowers is cultivated in flower gardens, under the name of carnation poppy. Among the ancients the poppy was sacred to Ceres.

POPPY HEAD, a generic term applied to the groups of foliage or other ornaments placed on the summits of bench ends, desks, and other ecclesiastical woodwork in the Middle Ages.

POPULAR SOVEREIGNTY, in United States history, a name given to the doctrine that the principle of slavery "should be kept out of the national legislature and left to the people of the confederacy in their respective local governments." While many of the Northern Democrats upheld this doctrine, the Southern element bitterly opposed it. Calhoun maintained that a man's right to his property, even though it be in slaves, must everywhere be upheld, so that he could take his slave into any territory regardless of the wishes of the inhabitants thereof. He nicknamed the doctrine "squatter" sovereignty. Douglas, its chief supporter, maintained that it was the basis of the Compromise of 1850, and in the Kansas-Nebraska Bill another attempt to apply it was made. But when it became evident that this doctrine

meant the admission of all future territories as free, the interpretation was strained so as to bring it within Calhoun's declaration, on the ground that a territory could not manifest its intentions on the subject till it was ready to be admitted as a State, or in other words, not through its territorial government. A disagreement on this subject led to the withdrawal of a part of the Democratic National Convention which nominated Douglas in 1860. After the Civil War, and with the abolition of slavery, the question of popular sovereignty died out.

POPULATION OF THE UNITED STATES. See CENSUS.

POPULIST PARTY, OR PEOPLE'S PARTY, an American political party founded at Cincinnati in 1891. It was the outgrowth of the "Grangers" and "Farmers' Alliance" parties, and was composed of great numbers from the farming and industrial classes of the Middle and Far West. Its political principles were the free coinage of silver, national ownership of the railroads, popular election of United States Senators and a graduated income tax. In 1892 the party nominated James B. Weaver of Iowa for President, and in that national election polled a popular vote of 1,055,424. In the succeeding presidential election the Populists indorsed the Democratic nominee, William J. Bryan, but named Thos. E. Watson of Georgia, for Vice-President. In 1900 the Populists again endorsed Bryan for President, but as in 1896, named a different man than the Democrats for Vice-President, this time, Charles A. Towne of Minnesota. Towne later withdrew and the National Executive Committee of the party nominated the Democratic nominee, A. E. Stevenson of Illinois. In addition to their principles hitherto mentioned the Populists added to their platform a plank condemning the imperialism in world politics of the Republicans and expressed their sympathy for the Boers in South Africa in their struggle against Great Britain. After 1900 the party lost strength either by the adoption of many of their principles by the Democratic party or by the indisposition of the voters to their radical ideas. They were never serious contenders in the political field after that date.

PORCELAIN, a fictile material intermediate between glass and pottery, being formed of two substances, fusible and infusible, the latter enabling it to withstand the heat necessary to vitrify the former, thus producing its peculiar semi-translucency. The infusible material is alumina, called kaolin; the fusible substance is feldspar, and is called pe-tun-tse, both Chinese terms. There are two kinds, hard and soft (*pâte dure* and *pâte tendre*); the hard body has more alumina and less silex and lime. Oriental porcelain is of two kinds, ancient and modern; the latter class includes imitations and reproductions. The manufacture began in China between 185 B. C. and A. D. 87, and reached its perfection during the Ming dynasty (1368–1644). The rarest Chinese wares are of the Tsin dynasty (A. D. 265–419), the Soui (581–618), and the Thang (618–907)—forms virtually extinct except as copies. The Tcheou porcelain (954–959) is so valued that fragments are worn as personal ornaments. Ware of the Song dynasty (960–1279) is also highly prized. Porcelain came by trade into Persia and Egypt, and was known in Syria in the 12th century. First imported into Europe by the Portuguese in 1520. In Japan the porcelain manufacture began before 27 B. C., with a whiter body and more brilliant glaze than that of the Chinese. It is doubtful if it was ever made in Persia. In Europe, Boettcher, a Saxon chemist, found kaolin while seeking the philosopher's stone; and Augustus II., Elector of Saxony and King of Poland, established and placed under his control the famous Meissen factory at the castle of Albrechtsburg in 1710; 40 years later 700 men were employed. In Vienna, Stölzel, who escaped from Meissen in 1720, began the Austrian factory, which in 1785 employed 500 men; another was established in Berlin by Frederick the Great. During the 18th century, works were begun in Russia, Holland, Denmark, Spain, Portugal, Switzerland and Italy. In France, soft porcelain was made at St. Cloud in 1695. Comte de Brancas-Lauraguan, in 1758, found kaolin near Alençon, and porcelain was made at St. Yrieix, near Limoges. The Sèvres manufactory was first established at Vincennes in 1740, and moved to Sèvres in 1756. In France, the manufacture of soft porcelain extends from 1695 to 1770, after which date the hard body of Sèvres takes its place. In England, William Cookworthy, a chemist of Plymouth, found kaolin at Tregonning, near Helstone, in Cornwall, and his patent of 1768 was worked at Plymouth for two or three years, when the works were removed to Bristol. At Chelsea and Bow soft porcelain had been made. These two were transferred to Derby in 1770 and 1776. Bristol had a soft body works in 1753; its best period was from 1774 to 1778. Worcester porcelain dates from 1751; its best period ended with 1783. Large

quantities of porcelain are produced in the United States. Trenton, N. J., is a center for the manufacture. See POTTERY.

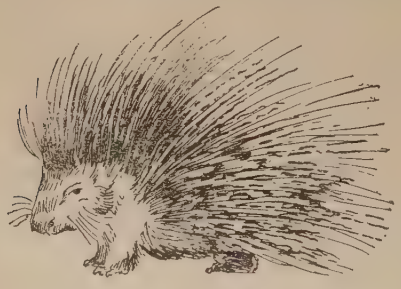
PORCELAIN CRAB (*Porcellana*), a name for certain crustacea, typical of the family *Porcellanidæ*, small smooth crabs. So called from their smooth polished shell.

PORCELLANITE, a very hard, impure, jaspideous rock, frequently met with in the immediate vicinity of intrusive eruptive masses. In most cases porcellanite is simply a highly baked and altered argillaceous rock—shales being frequently converted into porcellanite along their line of junction with an igneous rock.

PORCH, a covered entrance to a building; a covered approach or vestibule to a doorway. When a row of columns is added it becomes a portico. In some old churches the porches are of two stories, the upper being termed a parvis.

PORCH, THE, the School of the Stoics, so called because Zeno, the philosopher and founder of the sect, gave his lectures in the Athenian picture-gallery, called the *stoa poikile*, or painted porch.

PORCUPINE, the popular name for any individual of the genus *Hystrix* or the family *Hystricidæ* (divided into two groups, Hystricina and Synetherina, or two sub-families, *Hystricinæ* and *Sphingurinæ*). The common porcupine (*H. cristata*) may be taken as a type of the true porcupine. It is found in the S. of Europe, and the N. and W. of Africa, is about 28 inches long, exclusive of the tail, about four inches. It is somewhat heavily built, with obtuse head and short limbs. The head, fore quarters, and under surface are clothed with short spines, intermixed with hairs, crest on head and neck, hind quarters covered with long sharp spines, ringed with black and white, and erectile at will. They are but loosely attached to the skin and readily fall out. It is a purely vegetable feeder, and lives in holes in the rock, and burrows in the ground. The hairy-nosed porcupine is *H. leucura* (or *hirsutirostris*) from Syria, Asia Minor, and India; and the brush-tailed porcupines belong to the genus *Atherura*. They have long tails, tipped with peculiar flattened spines.



PORCUPINE

PORCUPINE CRAB, *Lithodes hystrix*, a native of Japan. The carapace is triangular, and, like the limbs, thickly covered with spines. It is dull and sluggish in its movements.

PORCUPINE FISH (*Diodon hystrix*), a fish of the order *Plectognathi*, found in the tropical seas. It is about 14 inches long, and is covered with spines or prickles.

PORCUPINE GRASS (*Triodia* or *Festuca irritans*), a brittle Australian grass which it is proposed to utilize in the manufacture of paper. See SPINIFEX.

PORCUPINE WOOD, the outer portion of the trunk of the cocoanut palm, a hard, durable wood, which, when cut horizontally, shows beautiful markings, resembling those of porcupine quills.

PORGY, POGGY, or **PAUGIE**, *Pagrus argyrops*, an important food fish found on the coast of the United States. It attains a length of 18 inches and a weight of about four pounds.

PORIFERA ("pore-bearing"), a term occasionally employed to designate the sponges.

PORK, the flesh of swine; one of the most important and widely used species of animal food. The swine was forbidden to be eaten by the Mosaic law, and is regarded by the Jews as especially typical of the unclean animals. Other Eastern nations had similar opinions as to the use of pork. Pork contains less fibrine, albuminous and gelatinous matter than beef or mutton, and is indigestible to anyone who is weak and debilitated. In the form of bacon, however, when well smoked and carefully prepared for the table, it acts as a stimulant to the stomach and is especially relished for breakfast. In the United States, prominently in the West, the pork-packing industry is one of the greatest factors of wealth.

POROSITY, the quality or state of being porous or of having pores; porousness; specifically, that property of matter in consequence of which its particles are not in absolute contact, but are separated by pores or intervals; the opposite to density.

PORPHYRIO, a genus of *Rallidæ*, sub-family *Gallinæ*, with 18 species, chiefly Oriental and Australian, but occurring in South America, in Africa, and in the S. of Europe. In habits they resemble the water hen, but are larger and more stately birds; bill and legs red, general plumage metallic blue.

PORPHYRITE, or **PORPHYRYTE**, a name used by some petrologists for the porphyritic orthoclase rocks which are free from quartz.

PORPHYRIUS, a Neo-Platonic philosopher; born in Batanea, Syria, A. D. 233; was a disciple first of Longinus, then of Plotinus, whose works he edited, and whom he succeeded as master of a school of philosophy at Rome. He wrote a "History of Philosophy," to which probably belongs the extant "Life of Pythagoras." Some fragments of his work against the Christian religion—condemned to the flames by the Emperor Theodosius II. in 453—are preserved in the writings of his adversaries. We have his tractate "On Abstinence from Animal Food"; also his "Homeric Questions," in 32 chapters. "Introduction to Philosophy," in which the question of realism and nominalism is first mooted; "On Deriving a Philosophy from Oracles"; and "On the Cave of the Nymphs." He died in Rome 304 A. D.

PORPHYROGENITISM, the principle of succession in royal families, and especially among the Eastern Roman emperors, by virtue of which a younger son, if born "in the purple" that is, after the succession of his parents to the throne, was preferred to an older son born previous to such succession.

PORPHYRY, a term originally applied to a rock having a purple colored base, with inclosed individual crystals of a feldspar. Any rock in which crystals of feldspar are individually developed, irrespective of the mineralogical composition of the whole, is said to be poryhyritic.

PORPOISE, the *Phocæna communis*, and any species of the genus; loosely applied by sailors to any of the smaller cetaceans. The common porpoise, when full grown, attains a length of about five feet. The head is rounded in front, and the snout is not produced into a beak. The external surface is shining and hairless, dark gray or black on the upper parts, under pure white. It is gregarious in habit, and is often seen in small herds, frequenting the coasts rather than the open seas. It often ascends rivers. It is found on the coasts of Scandinavia, and ranges as far N. as Baffin Bay and as far W. as the coast of the United States. It feeds on fish, and was formerly esteemed as an article of food. Its only commercial value now is derived from the oil obtained from its blubber, and its skin, which is used for leather and shoe laces.

PORRIDGE, a kind of dish made by boiling vegetables in water with or without meat; broth, pottage, soup; or a food made by slowly stirring oatmeal or similar substance in water or milk while boiling, till it forms a thickened mass.

PORSENNA, or **PORSENA**, a celebrated leader and king of Etruria, who declared war against the Romans because they refused to restore Tarquin to his throne. At first successful, he would have entered the gates of Rome had not Horatius Cocles stood at the head of a bridge and resisted the fury of the whole Etrurian army, while his companions behind were cutting off the communication with the opposite shore. This act of bravery astonished Porsenna. He made a peace with the Romans, and never after supported the claims of Tarquin.

PORSON, RICHARD, an English critic; born in East Ruston, England, Dec. 25, 1759. In 1777 he entered Trinity College, Cambridge, where he highly distinguished himself in classics, and in 1782 took the degree of B. A. and was chosen to a fellowship. This he resigned in 1792, since it could no longer be held by a layman, and Porson declined to take holy orders. Soon after he was unanimously elected Greek professor. He edited and annotated several Greek works, especially four of the dramas of Euripides, and enjoyed the reputation of being one of the best Greek scholars and critics of the age. In 1806 he was appointed librarian to the London Institution. He was familiar with English literature, and wrote for some of the chief periodicals of the day. He died in London, Sept. 25, 1808.

PORT, a harbor, natural or artificial; a haven; a sheltered inlet, cove, bay, or recess, into which vessels can enter, and in which they can lie in safety from storms. In law, a place appointed for the passage of travelers and merchandise into or out of the kingdom; a place frequented by vessels for the purpose of loading or discharging cargo.

PORT, a species of red wine, produced chiefly in the mountainous districts of Portugal, and shipped from Oporto. After the juice has been pressed from the grape, and fermentation fairly started, a certain quantity of spirit is added to impede the process, so as to re-

tain in the liquid some of the saccharine matter, as well as the flavor of the grape.

PORT, a framed opening in a ship's side through which a gun is fired, a hawser passed out, or cargo passed in or out. They are known by various names, as cargo port, gun port, etc.

PORTAL CIRCULATION, a subordinnate circulation of blood from the stomach and intestines through the liver.

PORTALIS, JEAN ETIENNE MARIE, a French jurist; born in Provence, April 1, 1745; practiced law in Paris, was imprisoned and prosecuted during the Revolution, but under Napoleon was the chief author of the famous "Civil Code." He died in Paris, Aug. 25, 1807.

PORTAL VEIN, a vein about three inches long, commencing at the junction of the splenic and superior mesenteric veins and passing upward a little to the right to reach the transverse fissure of the liver.

PORT ARTHUR, the terminus of the E. division of the Canadian Pacific railway, on Thunder Bay, an arm of Lake Superior, 993 miles W. N. W. of Montreal.

PORT ARTHUR, LUSHWANKAU, or LUSHUNKU, a former naval station of China, with a fine narrow-mouthed harbor at the end and on the E. side of the peninsula jutting S. W. from Manchuria, opposite Shifu, strongly fortified; formerly the headquarters of the N. fleet of China. It was taken by the Japanese in 1894, and was restored to China by coercion of European powers. On Dec. 19, 1897, a Russian fleet occupied Port Arthur with China's consent. On Jan. 28, 1898, the city was ceded to Russia. It was captured by the Japanese, January, 1905, after nearly a year's siege.

PORT ARTHUR, a city of Texas, in Jefferson co. It is on the Kansas City Southern and the Texas and New Orleans railroads. It is situated on several steamship lines and on several canals. It is the port of entry of the Sabine district. It is the center of the oil-producing and refining industry, and its other industries include rice milling and horticulture. There are several parks, pleasure piers, Port Arthur College, hospitals, and a Federal building. Pop. (1910) 7,663; (1920) 22,251.

PORT-AU-PRINCE, the capital of Haiti, situated on the W. coast, at the head of a bay of the same name. Pop. about 120,000.

PORT BRETON, a name given to the S. E. part of New Ireland, the scene in 1879 of a disastrous experiment in colonizing by a company of French Legitimists. The Marquis Du Rays, who floated the company, and his associates were condemned to various terms of imprisonment (1883) for fraud and raising money on false pretenses.

PORT CHESTER, a village in New York, in Westchester co. It is on Long Island Sound, and on the New York, New Haven and Hartford railroad. It is a popular suburb of New York. It has a park, a memorial library, a hospital, and excellent school buildings. Its industries include foundries, boat works, gas stoves, boiler works, etc. Pop. (1910) 12,809; (1920) 16,573.

PORTCULLIS, a strong defensive framework of timber, hung in grooves within the chief gateway of a fortress, or a castle, or an edifice of safety; it resembled the harrow, but was placed vertically, having a row of iron spikes at the bottom, and was let down to stop the passage in case of assault. There were frequently two or more portcullises in the same gateway.

PORT DARWIN, one of the finest harbors in Australia; situated on the N. coast of South Australia. Its entrance is 2 miles wide, and vessels of any tonnage can float in it with safety. Palmerston, the chief town on its shores, is the land terminus of the overland telegraph, 1,973 miles from Adelaide, and of the cable to Java, and the starting point of a railway (1891) to the gold fields of the interior, 150 miles distant.

PORTE, OTTOMAN, or SUBLIME PORTE, the common term for the Turkish Government. The chief office of the Ottoman empire is styled Babi Ali, literally, the High Gate, from the gate (*bab*) of the palace at which justice was administered; and the French translation of this term being Sublime Porte, hence the use of this word.

PORT ELIZABETH, a seaport of the British colony of the Cape of Good Hope; on the W. shore of Algoa Bay, 85 miles S. W. of Graham's Town and 350 S. of Kimberley. It is the principal seaport of the E. part of Cape Colony, and also of the Orange River Colony. The town was founded in 1820. Two piers were constructed to protect the harbor in 1881; and an aqueduct, 28 miles long, has brought good water to the town since 1878. Pop. (1918) 23,341.

PORTER, a carrier; one who carries burdens, parcels, luggage, etc., for hire. A dark colored malt liquor, so called

from having been originally the favorite drink of London porters. In forging (1) A long bar of iron attached in continuation of the axis of a heavy forging, whereby it is guided beneath the hammer or into the furnace, being suspended by chains from a crane above. A cross lever fixed to the porter is the means of rotating the forging beneath the hammer. (2) A smaller bar from whose end an article is forged, as a knife blade, for instance.

PORTER, DAVID, an American naval officer; born in Boston, Mass., Feb. 1, 1780, son of a naval officer. He was appointed midshipman in 1798, lieutenant the year after; saw service in the West Indies, and against Tripoli in 1801–1803; became captain in 1812, and captured the first British warship taken in the war. In 1813, with the "Essex" (32 guns), he nearly destroyed the English whale fishery in the Pacific, and took possession of the Marquesas Islands. March, 1814, his frigate was destroyed by the British in Valparaiso harbor. He afterward commanded an expedition against pirates in the West Indian waters, and was court-martialed for compelling the authorities at Porto Rico to apologize for imprisoning one of his officers. Porter resigned in 1826, and became head of the Mexican navy. In 1829 the United States appointed him consul-general to the Barbary States, and then minister at Constantinople, where he died, March 3, 1843.

PORTER, DAVID DIXON, an American naval officer; born in Chester, Pa., June 8, 1813; son of Commodore David Porter. He entered the navy as midshipman in 1829, was employed in 1836 to 1841 in the survey of the coast of the United States; in 1841 appointed as lieutenant to the frigate "Congress." In 1845 was transferred to the National Observatory at Washington, and during the Mexican War to the naval rendezvous at New Orleans; again to the coast survey, and from 1849 to 1853 engaged in command of the California mail steamers. At the commencement of the Civil War he was appointed commander of the steam sloop-of-war, "Powhatan"; distinguishing himself in the capture of New Orleans, and commanded the gunboat and mortar flotilla which co-operated with the squadron of Admiral Farragut in the first attack on Vicksburg. In the fall of 1862 he was placed in command of all the naval forces on the W. rivers above New Orleans, with the rank of rear-admiral. After the war he was appointed superintendent of the United States Naval Academy, Annapolis. He was made vice-admiral in 1866, and in 1870 became admiral. He died in Washington, D. C., Feb. 13, 1891.

PORTER, FITZ-JOHN, an American military officer; born in Portsmouth, N. H., June 13, 1822; was graduated at the United States Military Academy in 1845; served in the Mexican War, and made brevet captain and major for gallantry at Molino del Rey and Chapultepec. In 1861 was appointed colonel of the 15th U. S. Infantry, displaying great gallantry at Cold Harbor, Malvern Hill, Antietam, and Mechanicsville. For an alleged disobedience at the second battle of Bull Run, Aug. 29, 1862, Porter was court-martialed, and on Jan. 21, 1863, was cashiered. In 1878 a trial was granted, and the court recommended that the former sentence be reversed, and that he be restored to his former rank in the army, but no decisive action was taken. In 1882 President Arthur remitted so much of the penalty as prohibited him from holding office. New evidence came to light, General Grant affirming that Porter had been unjustly treated, and a bill was introduced in Congress providing for his reinstatement. In 1886 the bill passed both Houses, and became a law by the signature of the President. He died in Morristown, N. J., May 21, 1901.

PORTER, HORACE, an American diplomatist; born in Huntingdon, Pa., April 15, 1837, son of David R. Porter, who became governor of the State. After a year in the scientific department of Harvard University he entered the United States Military Academy. His graduation took place in 1860. After a brief space as instructor in artillery at West Point, he was assigned to duty in the Department of the East. He was promoted to be 1st lieutenant while under Sherman and Dupont in the expedition against Port Royal. In 1863 he was brevetted captain for gallant services at the capture of Fort Pulaski, where he had command of the siege batteries. In May, 1864, he was brevetted major for his conduct in the battle of the Wilderness. The next year found him brevet lieutenant-colonel, and 1865 brevet Brigadier-General of the United States army. He had been chief of ordnance of the army of the Potomac under General McClellan, but after the battle of Antietam was transferred first to the army of the Ohio and then to the army of the Cumberland. While on the staff of General Thomas at Chattanooga he became acquainted with General Grant. Their intimacy lasted till Grant's death. General Porter became an aide-de-camp on Grant's staff, and was with him during most of the rest of the war.

When General Grant became Secretary

of War General Porter became the assistant secretary, and during his chief's service as President acted as private secretary. General Porter then went into business and was exceedingly successful. He was president of the General National Society of the Sons of the American Revolution and the Grant Monument Association. The completion of the Grant monument is largely the result of his efforts. In 1897 he was appointed by President McKinley ambassador to France.

PORTER, ROBERT P., an American statistician; born in Norfolk, England, Jan. 30, 1852; settled in the United States in 1867, and soon afterward engaged in journalism. He was appointed United States commissioner to Cuba and Porto Rico in 1898-1899. Died 1917.

PORTER, SIDNEY WILLIAM (pseudonym O. Henry), an American author; born in Greensborough, N. C., in 1862. At 18 he moved to Texas, and worked successively as a bank clerk, editor of "The Rolling Stone," on staff of "The Houston Daily," etc. Among his works are "The Four Million," "Rolling Stone," "Cabbages and Kings," etc. He died in 1910.

PORT HURON, a city and county-seat of St. Clair co., Mich.; on the St. Clair and Black rivers, at the foot of Lake Huron and on the Pere Marquette, and the Grand Trunk railroads; 60 miles N. E. of Detroit. Here are a United States Government Building, electric light and street railroad plants, waterworks, public library, Government buildings, parks, public hospital, National and State banks, and daily and weekly periodicals. The city has a large trade with Canada. Its industrial plants include the shops of the Grank Trunk railroad, fiber, corset, and smelting works, saw mills, flour mills, automobile engines, dry docks and boiler works. Pop. (1910) 18,863; (1920) 25,944.

PORTICI, a town of Italy; on the slope of Vesuvius, 5 miles S. E. of Naples. Its environs are delightful, and are dotted over with country houses. The royal palace built (1738) by Charles III. is now an agricultural college. There are a small fort, fishing, and sea bathing. Silkworms are reared and ribbons made.

PORTICO, a covered walk, supported by columns, and usually vaulted; a piazza or arched walk; a porch before the entrance of a building fronted with columns. Porticoes are known as tetrastyle, hexastyle, octostyle, or decastyle, according as they have four, six, eight, or 10 columns in front. A prostyle portico is one projecting in front of the building; a *portico in antis* is one receding within the building.

PORT JERVIS, a town in Orange co., N. Y.; at the confluence of the Neversink and Delaware rivers, at the intersection of the boundary lines of New York, New Jersey, and Pennsylvania, and on the Erie, and the New York, Ontario and Western railroads, 88 miles N. W. of New York. Here are St. Mary's Orphan Asylum, Elks' Home, Federal building, street railroad and electric light plants, waterworks, a Soldiers' Monument at the intersection of the State boundary lines, National banks, and several daily and weekly newspapers. The town has iron foundries, railroad repair shops, silk mills, boot and shoe factories, etc. Pop. (1910) 9,564; (1920) 10,171.

PORTLAND, a city, port of entry, and county-seat of Cumberland co., Me.; on Casco Bay, and on the Boston and Maine, the Grand Trunk, the Portland and Rochester, the Maine Central, and other railroads; 105 miles N. E. of Boston. It has direct steamboat connections with Boston and New York, and two weekly steamship lines to Europe. The city is delightfully laid out along a peninsula, in the harbor, protected by a massive breakwater. Here are a custom house, City Hall, which contains a Municipal Organ, postoffice, United States Marine Hospital, the Maine General Hospital, headquarters of the Maine Historical Society, Portland Society of Natural History, the Wadsworth mansion, the Longfellow homestead, etc. The city has waterworks, several libraries, electric light and street railroad plants, National, State, and savings banks, Portland School for the Deaf, Old Men's Home, Old Ladies' Home, St. Elizabeth's Academy, etc. Portland has over 700 manufacturing establishments, with an annual output valued at over $15,000,000. The industries include boot and shoe factories, sugar refineries, rolling-mills, foundries, machine shops, locomotive works, engine and boiler works, petroleum refineries, match factories, chemical works, tanneries, paint and oil works, carriage and sleigh factories, manufactures of stoneware, jewelry, edge tools, varnishes, soap and lamps, meat packing establishments, coopering establishments, lumber mills, etc. Shipbuilding is still carried on, though of less importance, relatively, than in former years. Fishing and the shell-fish industry are extensively pursued. Portland was settled by the English in 1632; was burned by the Indians in 1676; and by the French and Indians in 1690; was rebuilt in 1715; burned by

the English in 1775; and rebuilt in 1783. It received its city charter in 1832. Pop. (1910) 58,571; (1920) 69,272.

PORTLAND, a city, port of entry, and county-seat of Multnomah co., Ore.; on the Willamette river, and on the Northern Pacific, Southern Pacific, Great Northern, Chicago, Burlington and Quincy, Canadian Pacific, and the Chicago, Milwaukee and St. Paul railroads; 12 miles above the Columbia river, 120 miles from the ocean, and 772 miles N. of San Francisco, Cal. The city is built on sloping ground; is surrounded by beautiful scenery; and has a most enjoyable climate, being much warmer in winter than many Southern cities.

Business Interests.—The Willamette river is navigable for large vessels, and a considerable trade is carried on with Great Britain, Japan, China, Hawaii, and the South American republics. The value of exports in 1920, which include wheat, flour, wool, fish, timber, etc., was $48,812,821, and the imports $7,042,702. There are more than 800 manufacturing establishments, with an output valued at more than $50,000,000 per annum. The principal manufactures are pig iron, woolen goods, flour, furniture, cordage, carriages, clothing, boots and shoes, engine boilers, etc. There are about 20 National, State, and private banks, and many daily, weekly, and monthly periodicals. The assessed property valuations exceed $226,000,000 and the total bonded debt is over $12,000,000.

Public Interests.—The city has an area of 66.3 square miles; 1,350 miles of streets; a system of waterworks, owned by the city that cost nearly $12,700,000, with 755 miles of mains. The streets are lighted by electricity at a cost of about $200,000 per annum. The police department costs annually about $382,000, and the fire department about $562,000. There is a public school enrollment of over 40,000 pupils, and an annual expenditure for public education of over $2,000,000. The annual cost of maintaining the city government is over $2,800,000. Portland contains the Medical and Law Schools of the State University, Portland University, Portland Academy, Library Association, Good Samaritan, St. Vincent, and Portland Hospitals, etc.

History.—Portland was settled in 1845 and received its city charter in 1851. It annexed the cities of East Portland and Albina in 1891. The city has had a marvelous growth and in proportion to its population has been said to be the wealthiest city in the United States. Pop. (1910) 207,214; (1920) 258,288.

PORTLAND BEDS, in geology, a series of marine beds, 180 feet thick, of Upper Oölitic age, found chiefly in PORTLAND (*q. v.*), but also in Oxfordshire, Buckinghamshire, and Yorkshire. They constitute the foundation on which the fresh-water limestone of the Lower Purbeck reposes.

PORTLAND CEMENT, a cement having the color of Portland stone.

PORTLAND, ISLE OF, a peninsula, supposed to have been formerly an island, in the county of Dorset, 50 miles W. S. W. of Southampton, in the British Channel. It is attached to the mainland by a long ridge of shingle, called the Chesil Bank, and it consists chiefly of the well-known Portland stone, which is chiefly worked by convicts, and is exported in large quantities. One of the most prominent objects in the island is the convict prison, situated on the top of a hill. The S. extremity of the island is called the Bill of Portland, and between it and a bank called the Shambles is a dangerous current called the Race of Portland.

PORT LOUIS, the capital and principal port of the British colony of Mauritius; on an excellent harbor on the N. W. coast, and inclosed by a ring of lofty hills. It is defended by forts (1887–1891), is a coaling station of the British navy, and has barracks and military storehouses. The city contains the government house, a Protestant and a Roman Catholic cathedral, a royal college, etc. Pop. about 50,000.

PORT MAHON, the capital of the island of Minorca; beautifully situated on a deep, narrow inlet in the S. E. of the island. Its harbor is one of the finest in the Mediterranean, and is protected by powerful forts and fortifications. Building stone, shoes, cottons, cattle, and honey are exported. The town was held by the English from 1708 to 1756, and again from 1762 to 1782. It was they who made it a first-class fortress.

PORTO ALEGRE, capital of the Brazilian state of Rio Grande do Sul. Pop. (1918) 1,852,207. N. W. extremity of the Lagoa dos Patos, by means of which it communicates with the sea. It was founded in 1742. It contains a cathedral, an arsenal, military and normal schools, an episcopal seminary, and a German club. Most of the wholesale trade is in the hands of the Germans. There are manufactories of pianos, furniture, brandy, and beer. The chief exports are beef, salt pork, lard, hides, and flour. Pop. about 150,000.

PORTOBELO, a small seaport town of Colombia, on the N. shore of the Isthmus of Panama, almost due N. of the town of Panama. It has an excellent harbor, discovered by Columbus in 1502, but is very unhealthy, and has fallen into decay since 1739, when it was stormed by Admiral Vernon, during the war between England and Spain.

PORTO MAGGIORE, a town of Italy, on an island in the Valli di Commacchio, midway between Ferrara and Ravenna, the chief occupations are cattle-breeding, fishing, and agriculture, the products comprising beet root, and grain. Pop. about 22,500.

PORTO NOVO, capital of Dahomey, French West Africa, near the Gulf of Guinea, with which it is joined by a stretch of shallow water leading to the seaport of Kotonu. It is connected by rail with Pobe, and has trade in oil and nuts. French administration headquarters situated here since last conquest of Dahomey in 1893. Pop. about 30,000.

PORTO NOVO, a small port on the Coromandel coast of India, 145 miles S. of Madras. Both the Danes and the Dutch had formerly a factory here. The place is celebrated for the battle fought here on July 1, 1781, when Sir Eyre Coote, with 8,000 men, defeated Hyder Ali and an army of 60,000.

PORTO RICO, the most easterly of the Greater Antilles Islands of the West Indies, a territorial possession of the United States. It has an area of 3,606 square miles. The island is roughly rectangular in shape. It is about 100 miles in length. The coast line is about 360 miles long, with comparatively few important indentations. A broken irregular range of hills passes across the island from east to west, ranging in height from 2,000 to 3,000 feet.

The annual range of temperature is from 90° to 50°, with an average of 76°. Rail falls almost daily, the annual precipitation being nearly 77 inches.

The island is famous for the number and size of its trees, which include several species of palms. There are also several varieties of hard wood useful in building. Although several metals occur on the island there is little or no mining. Gold, carbonate, and sulphide of copper have been found. No systematic survey of the mineral resources of the island has been made.

The chief industry of the people is agriculture. The principal crops are sugar cane, coffee, tobacco, and fruit. Of sugar, there were in 1918 256,431 acres under cultivation, and the total production was 453,796 tons. The production in 1919 was 406,002 tons. The exports of sugar in 1919 amounted to 351,910 tons, valued at $48,132,419. The exports of leaf and scrap tobacco in 1919 were valued at $8,420,538. The coffee production decreased from 37,618,613 pounds in 1918 to 27,897,971 pounds in 1919.

In 1918-1919 1,307 American and foreign vessels entered Porto Rico from the United States and foreign countries. The harbor of San Juan, chief port and naval station, has been improved and has an entrance of 600 yards square and 30 feet deep. There are about 1,100 miles of road on the island and about 339 miles of railway. The railway system nearly encircles the island and also penetrates the interior.

The total enrollment in the public schools in 1919 was 160,794. The total number of children of school age was about 440,000. There were enrolled in the rural schools about 98,000 pupils, and in the elementary schools about 54,000. Great advances have been made in education since the American occupation of the island.

Health conditions have greatly improved under the American administration, owing to the installation of sanitary systems in the larger cities and to more careful attention to sanitation in all parts of the island.

The total receipts for the fiscal year 1918-1919 amounted to $13,578,608, and the disbursements to $13,017,734. There was a balance on hand on July 1, 1919, of $5,022,316.

Government.—Porto Rico is governed in accordance with the terms of the Act of Congress of 1917. American citizenship was granted to the people. There is a representative government, the franchise being restricted to citizens of the United States, 21 years of age or over. The executive power resides in a governor, appointed by the President of the United States. There is a legislature of two elective houses. The Senate is composed of 19 members and the House of Representatives of 39 members. There is a resident commissioner to the United States who has a seat in Congress. There are six heads of departments which form a council to the governor known as the executive council. There is a Supreme Court of five members, appointed by the President, and seven district judges appointed by the governor. There are also municipal courts, the judges and officials of which are appointed by the governor.

History.—Porto Rico was discovered by Columbus on his second voyage, in 1493, and was afterward visited by

PORTO RICO
SCALE OF STATUTE MILES
0 5 10 15 20
SCALE OF KILOMETERS
0 5 10 15 20 25 30
Important towns are shown in heavy face type
Railways
Steamship Lines
L. L. POATES ENGR'G CO., N.Y.
1906
MONA ISLAND and PASSAGE
SCALE OF MILES
0 5 10 15
ATLANTIC OCEAN
CARIBBEAN SEA
Same scale as large map
Copyright, L. L. Poates Eng. Co., 1921

other Spanish explorers. Ponce de Léon occupied the island with a large military force and maintained headquarters there for ten years. The Spaniards remained in control of the island until 1898. It was visited often by pirates. San Juan was sacked in 1595 by Sir Francis Drake. Other attacks by English forces were defeated. Porto Rico was created a province of Spain in 1869, and slavery was abolished in 1873. The fortifications of San Juan were bombarded by a fleet under Admiral Sampson, in July, 1898, and a military expedition under General Miles took possession without opposition. By the Treaty of Paris, in 1898, Porto Rico was ceded to the United States. With the exception of political struggles, the American administration was without important event. In 1912 laws were passed providing for sanitary reform, a bureau of labor, and the minority representation. The inhabitants of Porto Rico were granted citizenship on March 2, 1917. Prohibition was voted by the people on July 16 of the same year. During 1918 officers' training camps were opened on the island and a large number of young men were trained for military service. In 1918-1919 a new election law was passed. Amendments were also made to the labor laws. The population of Porto Rico in 1910 was 1,118,012; in 1920, 1,297,772. The chief towns are San Juan, Ponce, and Mayaguez.

PORT SAID, a town of Egypt, on the W. side of the Suez Canal, on a desolate strip of land between Lake Menzaleh and the Mediterranean. The place owes its origin to the Suez Canal, being named after Saïd Pasha, its promoter, and depends wholly on the canal trade, being mainly a coaling station for steamers. Pop. with Ismailia, about 95,000. In the World War it was a military base for operations against the Turks.

PORTSMOUTH, the principal station of the British navy, a seaport, municipal and parliamentary borough of England, in Hampshire, on the S. W. extremity of the island of Portsea. It consists of the four districts, Portsmouth proper, Portsea, Landport, and Southsea, Portsmouth proper is a garrison town. Portsea is the seat of the naval dockyard; Landport is an artisan quarter; and Southsea on the E. side of the town of Portsmouth is a favorite seaside resort. The island of Portsea, which is separated from the mainland by a narrow creek called Portsbridge Canal, is bounded on the E. by Langston Harbor, on the W. by Portsmouth Harbor, and on the S. by Spithead and the Harbor Channel. The royal dockyard covers an area of about 500 acres, and is considered the largest and most magnificent establishment of the kind in the world. It includes vast store houses, containing all the materials requisite for naval architecture; machine shops, with all modern appliances; extensive slips and docks, in which the largest ships of the navy are built or repaired; ranges of handsome residences for the officials, and a Royal Navy College, with accommodation for 70 students. Outside the dockyard an area of 14 acres contains the gun wharf, where vast numbers of guns and other ordnance stores are kept. Portsmouth has no manufactures of any consequence, except those immediately connected with its naval establishments, and a few large breweries. Its trade, both coasting and foreign, is of considerable extent. Of late years an extensive and systematic series of fortifications has been under construction for the complete defense of Portsmouth. They extend along a curve of about 1½ miles at the N. side of Portsea Island. A series of hills, 4 miles to the N. of Portsmouth, and commanding its front to the sea, are well fortified with strong forts. On the Gosport side a line of forts extends for 4 miles. The municipal and parliamentary borough includes nearly the whole of the island of Portsea. It sends two members to the House of Commons. Pop. (1917) 178,327.

PORTSMOUTH, a city, port of entry, and county-seat of Rockingham co., N. H., on the Piscataqua river, and the Boston and Maine railroad; 40 miles E. of Concord. The harbor is deep and commodious, and much used as a haven of refuge. Here are a United States life-saving station, a signal-service station, custom house, Children's Home, Woman's Asylum, etc. It has manufactories of cotton fabrics, hosiery, ale and beer, boots and shoes, carriages, copper and brass foundry products, leather, soap, gloves, etc. Here the "Peace of Portsmouth" was made when Russian and Japanese representatives, at the suggestion of President Roosevelt, met in conference and signed a treaty of peace in 1905, concluding the Russo-Japanese War (1904–1905). Pop. (1910) 11,269; (1920) 13,569.

PORTSMOUTH, a city and county-seat of Scioto co., O.; at the confluence of the Scioto and Ohio rivers, on the Ohio canal, and on the Baltimore and Ohio Southwestern, the Norfolk and Western, and the Chesapeake and Ohio railroads; 114 miles S. E. of Cincinnati. It is the center and shipping port of a large mining and agricultural region. Here are a public library, United States

government building, Old Ladies' Home, etc. The industrial plants include rolling mills, iron and steel works, shoe factories, lumber mills, planing mills, flour mills, foundries, fire-brick kilns, paper box factories, wheel works, and veneer works. Pop. (1910) 23,481; (1920) 33,011.

PORTSMOUTH, a city and county-seat of Norfolk co., Va.; on the Elizabeth river, and on the Seaboard Air Line, the Chesapeake and Ohio, Atlantic Coast Line, and the New York, Philadelphia and Norfolk railroads; opposite Norfolk. It is the seat of a naval hospital and marine barracks, and in Gosport, on the S. E. edge of the city, is the Norfolk Navy Yard. The harbor is one of the best on the coast, and is accessible by the largest vessels. It has a steamboat line to Baltimore, and regular water connections with the chief coast cities of the United States. Here are street railroads, electric lights, an academy and seminary, the shops of the Seaboard Air Line railroad, etc. With NORFOLK (*q. v.*) Portsmouth was a naval station of great importance during the World War. Portsmouth exports large quantities of cotton, lumber, fruits, naval stores, etc. Pop. (1910) 33,190; (1920) 54,387.

PORTUGAL, THE REPUBLIC OF, forming the W. portion of the Iberian peninsula; bounded by Spain and the Atlantic; area 36,038 square miles; pop. about 6,000,000.

Topography.—The country generally inclines from N. E. to S. W. Several of the great mountain chains of Spain intersect it from E. to W. and terminate in large promontories in the Atlantic. The most remarkable of these chains is the Serra de Estrella, nearly in the center of Portugal. This chain is a continuation of the Serra de Gata, and culminates in an elevation of 7,524 feet above the level of the sea. Another chain is the Serra de Monchique, the extremity of which, Cape St. Vincent, is the S. W. point, not only of Portugal, but of Europe. The principal rivers are the Tagus, the Douro, the Minho, and the Guadiana.

Productions.—Wheat, barley, oats, flax, hemp, vines, and maize in the elevated tracts; rice in the low grounds, wth olives, oranges, lemons, citrons, figs, and almonds. Silk is made of a very good quality. There are extensive forests of oak in the N., chestnut in the center, and the sea pine and cork in the S. Oxen are employed as beasts of draught, and mules and asses as those of burden. Cattle, sheep, goats, and swine are numerous, and fish abound in the rivers and on the coasts. Iron mines are worked, and the mountains abound in fine marble, and contain traces of gold and silver. Of salt, large quantities are formed in bays along the coast, by natural evaporation. There are numerous salt marshes, and upward of 200 mineral springs. The manufactures are limited, principally consisting of woolens, silk, and earthenware. Cotton spinning is followed, and paper, glass, and gunpowder are made in a few places. The state religion is the Roman Catholic; but all others are tolerated. The peace strength of the army is 30,000 men, and the personnel of the navy is 6,000.

History.—Portugal forms the greater part of ancient Lusitania. It was subjugated by the Romans, in the time of Augustus, and was constituted into a province. In the 5th century, on the overthrow of the Roman supremacy, Portugal was invaded by the Alans and Visigoths, and suffered with Spain, of which it was then a part, all the troubles and vicissitudes endured by the inhabitants of the peninsula till the 8th century, at which time the Arabs, called indifferently Saracens or Moors, possessed themselves of the whole of Portugal, and kept absolute dominion for nearly 400 years. In the 12th century, Don Alonzo Henriquez, a Spanish prince of Leon and Castile, gained a great victory over the Moors of Portugal and was made King. Don Alonzo had no sooner received the crown, than he renounced all dependence on Spain and established a free and sovereign state.

Under the descendants of Don Alonzo I., especially Dennis I. and Alonzo IV., Portugal, during the next two centuries, rose in political importance and commercial prosperity. In 1385, the King of Castile having laid claim to the crown of Portugal on the death of Ferdinand, was opposed and defeated by Don John, Ferdinand's brother, and ascending the vacant throne, ruled his subjects with justice and prudence. Under John I. the Portuguese first projected those Atlantic discoveries on the African coast, fraught with such territorial and commercial advantages to the nation; and, under John II. and Emanuel, between 1481 and 1521, Vasco de Gama explored the Indian Ocean; the riches of the East began to pour into Europe; Goa became a prosperous possession, and Brazil was added to the possessions of the crown of Portugal. Sebastian III., fired with a holy zeal to exterminate the infidels from his country, commenced a sanguinary crusade against the Moors, which he carried on through such repeated defeats, that he eventually lost

both his crown and life in the struggle. Henry the Cardinal, his uncle, an old man of 70, ascended the throne, but died without heirs, after a reign of only two years, in 1580.

With Henry terminated the male line, after enduring for 460 years. Spain once more laid claim to the vacant throne, and Portugal again became a dependency of the Spanish crown, the nation suffering all the injustice, exactions, and tyranny usually inflicted on a conquered country by its haughty masters. After enduring 60 years of intolerable hardships and exactions, a Portuguese nobleman named John, Duke of Braganza, pitying his unfortunate countrymen, excited a revolution, which again broke the Spanish fetters, while the people hailed their deliverer as their king, who, being crowned as John IV., commenced the dynasty of the House of Braganza, a family whose descendants held sway until the Republic. When Napoleon, in 1807, entered the country, and declared the family of Braganza had ceased to reign, the royal family of Portugal, and all the court, set sail from the Tagus to Brazil. After the downfall of Napoleon, the history of Portugal is composed of a long succession of political disturbances. At the death of Queen Maria da Gloria her eldest son ascended the throne, in 1853, as Pedro V., and died prematurely in 1861, leaving the throne to Louis I., second son of Dona Maria. In October, 1889, Carlos I., his son, succeeded to the throne. His reign created great discontent and on Feb. 1, 1908, the King and Crown Prince were assassinated. The second son was raised to the throne as Manuel II., but was deposed in the revolution of Oct. 1910, when a republic was proclaimed under Theo. Braga. The republic was formed in September, 1911, with Dr. Arriaga as President. Shortly after the outbreak of the World War in 1914, Portugal took sides with England and aided in the South African campaign.

PORTUGUESE EAST AFRICA OR MOZAMBIQUE, a possession of Portugal on the E. coast of Africa, having an area of 293,400 square miles and population of about 4,000,000. Almost all of the inhabitants belong to the Bantu race, although in the southern portion there are a number of Zulus. The colony is rich in mineral resources, but because of the tropical and unfavorable climate, as well as the bad transportation facilities these have been little developed. The chief mineral deposits are coal, iron and gold and thus far have been exploited mostly by British subjects. The principal products are cocoanuts, bananas, indigo, coffee, and rubber. Three ports do almost all the export and import trade, the coast affording but few harbors. The capital is Lourenço Marques with a population app. 10,000.

PORTUGUESE GUINEA, a possession of Portugal on the E. coast of Africa, with an area of about 14,000 miles and a population of about 800,000. Portuguese authority is respected only in the coast towns, the interior of the colony being largely unexplored. The coast affords several harbors, but because of strong currents navigation is dangerous. The climate is very hot and unhealthy. The commerce, which is controlled by the French, consists in the exporting of ivory, wax, and rubber, and the importing of manufactured goods. The forests contain a number of valuable woods, and the chief crops of the province are rice and millet. The capital is Bulama, situated on the island of the same name. This town divides the commerce with Bissao and Cacheo.

PORTULACA, purslane; the typical genus of the *Portulacaceæ;* low, succulent herbs with flat or cylindrical leaves, and yellow, purplish, or rose-colored ephemeral flowers. Known species between 30 and 40; most of them from the warmer parts of America. *P. oleracea* is the common purslane. It is a low, succulent annual, often eaten by the Hindus as a potherb. *P. quadrifida*, also Indian, is eaten and considered cooling by the natives. The fresh leaves of both species are used as an external application in erysipelas, etc., and an infusion of them as a diuretic.

PORTULACACEÆ or **PORTULACEÆ**, purslanes; an order of hypogynous exogens, alliance Silenales. Succulent herbs or shrubs, generally with alternate, entire leaves; axillary or terminal flowers, which expand only in bright sunshine. Sepals two; petals five, distinct, or joined into a tube; stamens varying in number; carpels three or more; ovary and capsule one-celled, the latter dehiscing transversely, or by valves (Lindley). Known genera 15, species 125 (Sir Joseph Hooker).

PORTUMNUS, or **PORTUNUS**, the Roman god of harbors. The Portumnalia were yearly celebrated in his honor.

POSE, in heraldry, a term applied to a lion, horse, etc., represented standing still, with all his feet on the ground; statant.

POSEIDON, the Greek god of the sea, identified by the Romans with the Italian deity Neptunus. A son of Kronos and Rhea, and hence a brother of Zeus,

Hera, and Demeter, he was regarded as only inferior in power to Zeus. His usual residence was in the depths of the sea near Ægæ, in Eubœa, and the attributes ascribed and most of the myths regarding him have reference to the phenomena of the sea. The horse, and more particularly the war horse, was sacred to Poseidon, and one of the symbols of his power. During the Trojan War Poseidon was the constant enemy of Troy, and after its close he is described as thwarting the return of Ulysses to his home for his having killed Polyphemus, a son of the god. Poseidon was married to Amphitrite. His worship was common throughout Greece and the Greek colonies, but especially prevailed in the maritime towns. The Isthmian games were held in his honor. In works of art Poseidon is represented with features resembling those of Zeus, and often bears the trident in his right hand. A common representation of him is as drawn in his chariot over the surface of the sea by hippocamps (monsters like horses in front and fishes behind) or other fabulous animals.

POSEN, a province in eastern Europe which prior to the World War belonged to the German Empire, but which by the treaty of Versailles in 1919 Germany ceded to the new Polish state. Its area is 11,184 square miles and its estimated population is over two millions. Even before its cession to Poland the majority of its inhabitants were Poles and spoke the Polish language, in spite of the vigorous repressive measures adopted by the German Government. Almost seventy-five per cent. of the population belong to the Roman Catholic Church. Posen until 1793 formed a part of Poland; the treaty of Versailles merely restored it to its rightful owner. The population is engaged chiefly in agriculture, less than twenty-five per cent. being employed in the factories. The chief products are the grains, rye, wheat, oats, and barley. The principal industry is the manufacture of spirituous liquors.

POSEN, a fortified town formerly belonging to Prussia, now to Poland, capital of the province of the same name and an archbishop's see, stands on the Warthe, 149 miles E. by S. of Berlin. It is surrounded by two lines of forts, is built with considerable regularity, has generally fine wide streets, and numerous squares or open spaces. The most noteworthy public buildings are the cathedral, in the Gothic style (1775), the town parish church, a fine building in the Italian style, both Roman Catholic; the town house (1508), with a lofty tower; the Raczynski Library; the municipal archive building, etc. The manufactures consist chiefly of agricultural machines, manures, woolen and linen tissues, carriages, leather, lacquerware, etc. There are also breweries and distilleries. Pop. about 175,000.

POSES PLASTIQUES, or TABLEAUX VIVANTS, imitations of pictures by living persons taking the place of those depicted.

POSIDONIUS, a Greek Stoic philosopher; born in Apamea, Syria, but styled "The Rhodian" by reason of his long residence in the island of Rhodes; lived from 135 to 50 B. C. He was one of the most learned men of antiquity, his knowledge and his writings extending over every branch of science. His greatest work was a universal history in 52 books, held in high esteem by the ancients; it was a continuation of Polybius, and covered the period 145–82 B. C. His lectures on "Tactics" would seem to be the basis of the tractate of his disciple Asclepiodotus on the same subject.

POSILIPO, a mountain of Italy, on the N. W. of Naples, close by the city, from of old a noble site for the villas of wealthy citizens. It is remarkable for the tunnel known as the Grotto of Posilipo, through which the road from Naples to Pozzuoli passes. The grotto varies in height from 20 feet to 80 or more, is 20 to 30 feet wide, and 755 yards long. It is traditionally said to have been made in the reign of Augustus, but is probably earlier. Above the eastern archway of the grotto is the so-called "Tomb of Vergil." At the base of the hill anciently stood the poet's villa. During the Middle Ages the common people believed the grotto to be the work of the poet, whom they regarded as a great magician. Two other tunnels penetrate through the hill, one to the N. of the grotto, 800 yards long, 39 feet high, and 33 feet broad, made for the tramway, and another constructed at the command of Agrippa in 37 B. C., but only discovered in 1812.

POSITIVE, in photography, a picture obtained by printing from a negative, in which the lights and shades are rendered as they are in nature. See PHOTOGRAPHY.

POSITIVE PHILOSOPHY, the system of philosophy outlined by Auguste Comte (1798–1857) in his "Philosophie Positive," the sixth and last volume of which was published in 1842. It is the outcome of the Law of the Three Stages and is based on the positive sciences, taken in the following series: mathe-

matics (number, geometry, mechanics), astronomy, physics, chemistry, biology, and sociology. It relinquishes attempts to transcend the sphere of experience, and seeks to establish by observation and induction laws or constant relations, and resigns iself to ignorance of the agents. In the opinion of its founder it is capable of being developed into a religion and a polity.

POSITIVE SOCIETY, a society founded in Paris in 1848, by Comte, in the hope that it might exert as powerful an influence over the revolution as the Jacobin Club had exerted in 1789. In this he was disappointed, but the disciples who gathered around him were the germ of the Positivist Church.

POSITIVISM, the religion of Humanity, developed from the positive philosophy, and claiming to be a synthesis of all human conceptions of the external order of the universe. Its professed aim, both in public and private life, is to secure the victory of social feeling over self-love, of altruism over egotism.

POSSE COMITATUS, a force or body which the sheriff of a county is empowered to raise in case of riot, possession kept on forcible entry, rescue, or other attempt to oppose or obstruct the execution of justice.

POSSESSION, a word having several applications: 1. The act or state of possessing or holding as owner or occupant; the state of owning or being master of anything; the state of being seized of anything; occupancy ; ownership, rightful or wrongful. 2. That which is possessed; property, land, estate, or goods owned. 3. A district, or extent over which a person or thing has power or authority. 4. The state of being possessed or under the power of evil spirits, passions, or influences; madness, lunacy. 5. An idea, a prepossession, a presentiment.

In civil law, the holding or having as owner or occupier, whether rightfully or wrongfully; actual seizing or occupancy. In international law, a country or territory held by mere right of conquest. In Scriptures, the taking possession of the body or spirit by demons or devils. They produced bodily disease or defect as dumbness (Matt. ix: 32–34), blindness and dumbness (xii: 22–30) epilepsy with dumbness (Mark ix: 17–27); and a woman who had had a spirit of infirmity 18 years is described as bound that length of time by Satan (Luke xiii: 16). Mentally, the possession by an unclean spirit produced symptoms almost indistinguishable from those of madness (Mark v: 2–20). Jesus, when on earth, cast out demons (Matt. iv: 24).

POSSIET, CONSTANTIN NICOLAVICH, a Russian naval officer; born in 1819; early entered the navy; was Minister of Ways of Communication in 1874–1888. While holding this office he made extensive improvements in the harbors and waterways of Russia; was president of the Russian Association for Saving Life, and established most of the life stations in Russia. From 1889 to 1899 he was a member of the Council of State. He died in St. Petersburg, May 8, 1899.

POST, GEORGE BROWNE, an American architect; born in New York City in 1837; studied with Richard M. Hunt; designed numerous private residences and public buildings; and became president of the American Institute of Architects, the National Arts Club, and the American Society of Civil Engineers. He died in 1913.

POSTAGE STAMPS, a term employed to indicate not really a stamp or impression, but a printed label pasted on packages and letters to show that the cost of carriage has been already paid. Such stamps may be issued by the government or by carrying companies. The term in the main is restricted to stamps issued by stable governments, and in such case the stamps have a recognized value in accordance with the amount indicated on their face. The two main divisions are adhesive stamps and stamps actually engraved in the envelope. The adhesives are placed on the matter to be delivered, and this has been the method in vogue since 1840, when Rowland Hill conceived his uniform Penny Postage plan and succeeded in having it established in Great Britain. Up to that time it had been the custom to charge for the transportation of letters and packages in proportion to the distance covered, and these charges often mounted to a considerable sum, such as "twelve pence" or 24 cents for a distance of 250 miles. The charges were also usually not prepaid, and there was frequent loss to the carrying company in cases of refusal of payment on the part of the addressee. The great growth in correspondence which followed the innovation and the trifling cost involved in the production of stamps guaranteed its success from a financial point of view from the start.

The use of the prepaid stamp speedily spread to other countries, and was gradually taken up by the governments of the different nations with the assumption by these governments of the national

forwarding of letters. The recognition of the Universal Postal Union, which issued rules governing the issue of international postage stamps, the character of their designs, and the value represented by them, was the final development in the issue and use of postage stamps.

While the varieties of postage stamps are many, their characteristics are restricted within certain defined limits. Its shape is usually square, but it may take other forms, and its size has remained very much as it was in the original issue. In recent years it has become a practice in several countries to celebrate national events by the issue of commemorative stamps. The vogue has been greater in American countries than in more conservative Europe, where, in the case of monarchies, it has been the custom to print the monarch's head on the stamp. Though stamps have not greatly differed in their designs since the first issue, there has been a great development in the modes of their production, in proportion to the growth in general correspondence. In general the earlier designs, being engraved by hand, are superior to the later ones, and are more valued by the collector apart from the rarity. The collecting of stamps, styled philately, has long had an international vogue particularly among young people.

POSTAL SAVINGS-BANKS have been in successful operation for several years in many Old World countries, and public opinion favoring their establishment in the United States, has grown steadily stronger. In the Presidential campaign of 1908 the scheme was indorsed by all the political parties. It had the support of both Presidents Roosevelt and Taft. Postmaster-General Meyer pointed out that 98.4 per cent. of all the savings-bank deposits in the United States are in 14 States, and only 1.6 per cent. in the other 34 States; and that while there was one savings-bank depositor out of every two inhabitants in New England, there was only one out of every 157 inhabitants in the rest of the country, New York State alone excepted. A postal savings-bank system was started in the Philippines on June 30, 1909, which in 1910 had 13,102 accounts and $839,623 on deposit. President Taft's exertions to secure the enactment of a postal bank law were unsuccessful in 1909, in part owing to the opposition to the project raised by the American Bankers' Association; but in June, 1910, the desired bill was passed by Congress. This creates a board of trustees composed of the Postmaster-General, the Secretary of the Treasury, and the Attorney-General. They are to select the post-offices at which deposits may be received. Deposits from one person must not exceed $100 a month or $500 in all. An account may be opened with $1. Interest will be paid at the rate of 2 per cent. Depositors may exchange their deposited money for government bonds paying 2½ per cent., to be issued in denominations of $20, $40, $60, $80, $100, and $500. The post-offices are to deposit 65 per cent. of the money in National and State banks of the vicinity, which are to pay 2¼ per cent. for the use of it, and give acceptable security. Five per cent. of the deposits must be held by the Secretary of the Treasury as a cash reserve; and not more than 30 per cent. may be withdrawn by the Government, at the direction of the President, for investment in Government bonds.

The system was inaugurated at one post-office in each of the 48 States, including New Mexico and Arizona, and in 1911 was extended to the larger cities. See Article UNITED STATES: Section POST OFFICE.

POSTAL SERVICE, the regulation of communication between different parts of a country, or different countries, including especially the forwarding and delivering of letters, newspapers and small packages, and the establishment of a registry system for the transfer of money and the transaction of other financial business. In some countries the use of the telephone and the telegraph forms a part of the postal service. Though letter conveyance is the primary work of the postoffice, many other branches of business have been assumed by it. The word "post" has its particular application from the posts, or stages, at which on the roads of the Roman empire couriers were maintained for the purpose of conveying news and despatches.

Postal Union.—Under the terms of a treaty concluded at Berne, Oct. 9, 1874, the object of which was to secure uniformity in the treatment of correspondence, and the simplification of accounts, as well as the reduction of rates within certain limits, and whose provisions were carried into operation generally July 1, 1875, the whole of Europe, the United States, Egypt, British India, and all the colonies of France were at the outset, or shortly thereafter, included in the union and many other countries and colonies have since joined it. The international accounts in respect of postages are based on a month's return of correspondence taken every third year.

United States.—The beginnings of a postal service in the United States date

Photo, Brown Brothers

A PINEAPPLE PLANTATION IN AUSTRALIA

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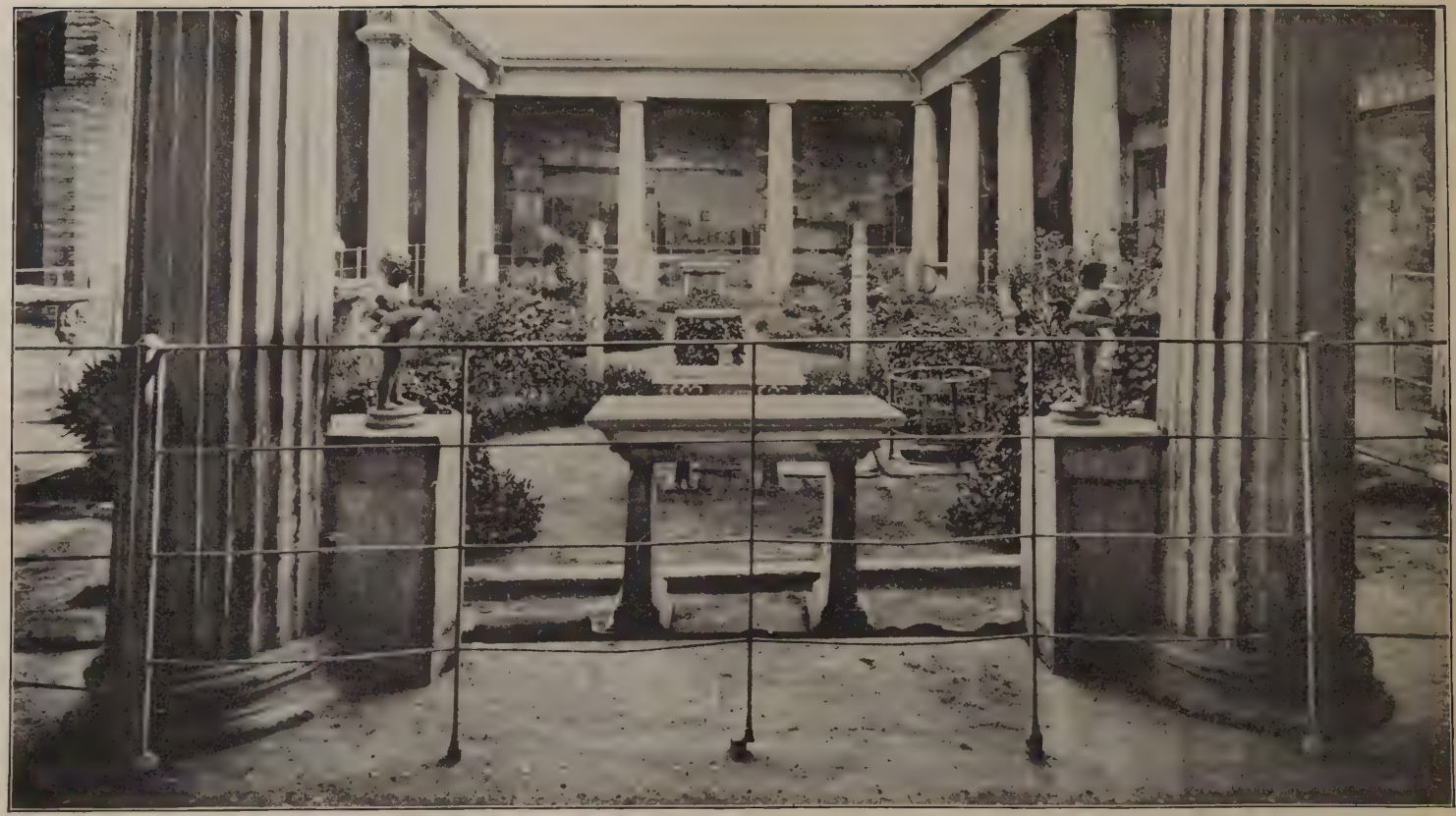
PLYMOUTH ROCK, PLYMOUTH, MASS.

©*Keystone View Company*

PROVINCETOWN, MASS., WITH THE PILGRIM MONUMENT IN THE BACKGROUND, TO COMMEMORATE THE LANDING OF THE PILGRIMS AT THIS PLACE

©Modern Photo Service

THE AMPHITHEATER AT POLA, ON THE ADRIATIC SEA



THE PERISTYLE OF THE HOUSE OF VETTI, AT POMPEII

© Publishers' Photo Service

RUINS OF POMPEII, WITH VESUVIUS IN THE DISTANCE

©E. M. Newman

THE GOVERNOR'S PALACE, PORTO RICO

©E. M. Newman

A COUNTRY HOME AND NATIVE FAMILY IN PORTO RICO

© Newman Traveltalks and Brown & Dawson

PLOWING WITH MODERN MACHINERY IN PORTO RICO

from 1639, when the house of Richard Fairbanks in Boston was employed for the receipt and delivery of letters for or from beyond the seas. He was allowed for every letter a penny and was obliged to answer all miscarriages through his own neglect. In 1672 the government of New York colony established "a post to go monthly from New York to Boston"; in 1702 it was changed to a fortnightly one. A general postoffice was established and erected in Virginia in 1692, and in Philadelphia in 1693. A deputy postmaster-general for America was appointed in 1692; and by act of Parliament in 1710 he was directed to keep his principal office in New York, "and other chief offices in some convenient place or places in other of Her Majesty's provinces or colonies in America"; a monopoly was established which included also the transport of travelers, and a tariff was fixed. The system, however, proved a failure, till 1753, when Benjamin Franklin became postmaster-general; when he was removed from office in 1774 the net revenue exceeded $15,000.

In 1789, when the postoffice was transferred to the new Federal Government, the number of offices in the 13 States was only about 75. Events in the history of the American postal service have been the negotiation of a postal treaty with England (1846); the introduction of postage stamps (1847), of stamped envelopes (1852), of the system of registering letters (1855); and the establishment of the free-delivery system, and of the traveling postoffice system (1863); the introduction of the money order system (1864), of postal cards (1873), and, between the last two dates of stamped newspaper wrappers, and of envelopes bearing requests for the return of the inclosed letter to the writer in case of non-delivery; the formation of the Universal Postal Union (1873); the issue of "postal notes" payable to bearer (1883); and the establishment of a special-delivery system (1885), under which letters bearing an extra 10-cent stamp are delivered by special messengers immediately on arrival. See UNITED STATES: Section POST OFFICE.

POSTERS, a bill or placard, printed or illustrated, conspicuously exhibited to convey a message to the public. The practice of using placards for public information had its vogue among both the Greeks and Romans, but the invention of printing gave the custom a development which has kept pace with modern civilization. In several cities of Europe it was the practice in the 17th century to affix theatrical announcements to the rails and posts in the streets, and in Paris the color of the poster indicated the theater. The posters sometimes consisted of letterpress large and bold enough to catch the public eye; sometimes the posters had representations of characters and scenes from the play. The colored poster, as we now know it, was developed by Chéret, the lithographer, in Paris, who issued the first example of his skill in 1866. The circus and the theater have had the chief hand in the development of the pictorial poster, which, by the representation of stage characters, ballet girls, children, and animals, has attained a high level of art. The French poster designers, among them Grasset, Toulouse-Lautrec, Willette, Forain, Guillaume, Schwaebe, and Gossard, have given France first place in the art, but the art has attained a great development in the United States, and men like Penfield and Bradley gave it the impetus which has carried it into every field of advertising that allows pictorial representation.

POST GLACIAL, in geology, a term applied to the oldest division but one of the post-Tertiary period.

POST-IMPRESSIONISM, a term used to designate the development in art that succeeded impressionism, a movement in the domain particularly of painting and sculpture, that sought the representation of the subjective conception of nature rather than nature itself. In these new theories the depicting of light plays an important part, and an effort is made to find expression for the things that lie behind the surface, the human feeling and conception, the qualities of depth, and weight, and permanence, and the abstractions as opposed to the superficial appearance of things. The attempts to embody these ideas in color and stone have resulted in representations having little resemblance to objects as they appear to the eye. Both Cubism and Futurism are developments of Impressionism and Post-Impressionism. In Cubism geometrical forms play a large part. Picasso, the Spanish sculptor and painter, was the first to give the movement an international vogue, and in the establishment he had the co-operation of both French and Spanish artists, who organized the first collective exhibition in Paris in 1911. Futurism had its birth almost simultaneously with Cubism, the originator being the Italian Marinetti. Its central idea is the representation of the interior energy and possibility of objects in nature and the results are usually bizarre. The movements have spread to all the countries of Europe and America, but though they have found conspicuous adherents, and embody cer-

tain truths, the more successful Post-Impressionists have remained faithful to the traditions of the old masters, blending as far as they can what is new and true to the older principles of the arts.

POSTING, traveling by means of horses hired at different stations on the line of journey, a system established in England as early as the reign of Edward II.

POSTMASTER-GENERAL, the chief of the postoffice department.

POST MILL, a form of wind mill so constructed that the whole fabric rests on a vertical axis, and can be turned by means of a lever.

POST MORTEM, after death, as a post-mortem examination, *i. e.*, one made after the death of a person, in order to ascertain the cause of death either in the interests of science, or for the ends of justice.

POST OBIT, a bond given as security for the repayment of a sum of money to a lender on the death of some specified person, from whom the borrower has expectations. Such loans in almost every case carry high, if not usurious, rates of interest, and generally the borrower binds himself to pay a much larger sum than he receives, in consideration of the risk which the lender runs in case of the borrower dying before the person from whom he has expectations.

POST-PLIOCENE, in geology, in the etymological sense, more modern than the Pliocene, *i. e.*, embracing all the deposits from the end of the Pliocene till now; but Lyell, who introduced the term, restricts it to the older of these, applying the term Recent to the others.

POSTULANT, one who asks, demands, or requests; a candidate; specifically, in the Roman Church, one seeking admission to a religious order or congregation. The postulant is bound by the rules of the order to which he or she is seeking admission, but does not wear its distinctive dress till the habit is conferred.

POSTULATE, a position, supposition, or proposition assumed without proof, as being self-evident or too plain to require proof or illustration; a thing assumed for the purpose of future reasoning; an assumption. In geometry, the enunciation of a self-evident problem.

POTASH, a term applied to the hydrate of potassium, KHO, either in the liquid or solid state, but sometimes used to denote potassium oxide and also crude carbonate of potassium. Potash salts are essential constituents in the human body, but if, when wasted, they are supplied directly to the blood they are very poisonous. A much diluted solution of potash is antacid and sedative in dyspepsia and cutaneous diseases, also in pleuritis, pericarditis, scrofula, etc. Caustic potash is used externally as a caustic in ulcers, etc.; carbonate of potash has been given in whooping cough; acetate of potash, nitrate of potash, and, in small doses, tartrate of potash are diuretics; acid tartrate of potash is purgative and used in dropsy; citrate of potash is diuretic and febrifugal; sulphate of potash is a mild purgative generally given with rhubarb, etc.; nitrate of potash and chlorate of potash are refrigerants and diuretics.

POTASH LIME, a mixture of dry hydrate of potassium and quicklime employed in estimating the nitrogen contained in organic substances. At a high temperature, it liberates the nitrogen in the form of ammonia.

POTASH WATER, an artificial aërated water containing a minute quantity of potassic bicarbonate.

POTASSIUM, symbol, K; at. wt., 39, a monad metallic element, discovered by Davy in 1807, and very widely diffused through the vegetable, mineral and animal kingdoms. It may be obtained by electrolysis, but is now produced in large quantity by distilling in an iron retort an intimate mixture of charcoal and carbonate of potassium, a condition readily obtained by igniting crude tartar in a covered crucible. It can only be preserved in the metallic state by immersing it in rock oil.

POTATO, or **POTATOE**, *Solanum tuberosum*, a well-known plant, the tubers (dilated branches) of which are eaten. It is a native of Chile and Peru. Some think that it was first brought to Spain from the mountains near Quito early in the 16th century. Thence it spread to Italy and Austria. Sir Walter Raleigh is supposed to have taken it to England in July, 1586. For the next century and a half they were regarded as garden plants only. They gradually made way to the important position which they now occupy in agriculture.

POTATO DISEASE, a disease or murrain produced by a fungus, *Peronospora infestans*. It generally first attacks the leaves and stems of the plant, forming brown spots on them in July and August. By this time the fungus, which first penetrated the tissue of the leaf, has thrust forth through the stomates its conidia-bearing filaments. The leaves soon afterward die. Next the tubers

are attacked and decay, either in a moist manner, attended by a disagreeable odor, or by a drying up of the tissue. The potato disease first appeared in the United States. In 1845–1847 it caused the failure of the potato crop in Ireland, producing famine. It has never since completely disappeared. When it is prevalent, the potatoes should be powdered with flowers of sulphur before being planted.

POTATO FLY (*Anthomyia tuberosa*), a dipterous insect of the same genus with the radish fly, cabbage fly, turnip fly. In its perfect state it is very like the house fly. The potato-frog fly (*Euteryx solani*, Curtis) and the caterpillar of the death's-head moth (*Acherontia atropos*, Linn.) feed on the leaves and stems of potatoes, but rarely do serious damage.

POTEMKIN, GREGORY ALEXANDROVITCH, a Russian general, a favorite of the Empress Catharine II.; born in September, 1736; descended from an ancient Polish family, and early trained to the military profession. From 1776 till his death, he exercised a boundless sway over the destinies of the empire. In 1783 he suppressed the khanate of the Crimea, and annexed it to Russia. In 1787, being desirous of expelling the Turks from Europe, he stirred up a new war, in the course of which he took Oczakoff (1788). In the following year he took Bender, but as the finances of Russia were now exhausted Catharine was desirous of peace. Potemkin, however, resolved on conquering Constantinople, and went to St. Petersburg to win over the empress to his side (March, 1791); but during his absence Catharine sent plenary powers to Prince Repnin, who signed a treaty of peace. Potemkin died in Nicolaieff, Oct. 16, 1791.

POTENTIAL, in electricity, a term holding the same relation to electricity that level does to gravity. The potential of the earth is taken at zero. Potential in physics is the sum of each mass-element of the attracting body divided by the distance of that element from the attracted point. Also, capable of being exerted, though not acting at the particular moment.

POTENTIAL MOOD, that form of a verb which is used to express power, possibility, liberty, or necessity of an action or of being; as, he may go, you should write.

POTENTILLA, cinquefoil, the typical genus of *Potentillidæ*. Flowers white or yellow, rarely red; calyx, five, rarely four lobed, with as many small bracts; petals, five, rarely four: style, short, lateral, or nearly terminal; achenes, many, minute, on a small, dry receptacle. Chiefly from the N. temperate and Arctic zones. Known species, 120.

POTENZA, a town of southern Italy; in a valley of the Apennines; 103 miles E. by S. of Naples. It is surrounded by a wall, has a fine cathedral, and disused fortifications. Potenza was shaken by earthquakes in 1273, 1694, 1812, and 1857. Pop. (1917) 17,938.

POTI, a seaport of Russian Caucasus; at the mouth of the Rion river, on the E. shore of the Black Sea, 200 miles W. of Tiflis. Here maize and manganese are shipped. Poti was seized by Russia in 1828.

POT METAL, a cheap alloy for faucets; etc.; composed of copper, 10; lead, 6–8. (2) A kind of cast-iron suitable for casting hollow ware. (3) A species of stained glass, the colors of which are incorporated with the glass while the latter is in a state of fusion in the pot.

POTOCKI, an ancient Polish family, taking its name from the castle of Potok, and still holding possessions in Galicia and the Ukraine. Among its most distinguished members was Count Ignatius, Grand Marshal of Lithuania before the downfall of Poland, and a fellow-patriot of Kosciusko, born in 1751. In 1791 he took refuge in Saxony, returning, however, to share in the last struggle for independence. He was some time in the prisons of St. Petersburg and Warsaw, and died in Vienna in 1809.

POTOMAC, a river of the United States, formed by two branches which rise in the Allegheny Mountains in West Virginia, and unite 15 miles S. E. of Cumberland, Md., from which point the river flows in a generally S. E. course 400 miles, and falls into Chesapeake Bay, after forming an estuary nearly 100 miles long, and from 2½ to 7 miles wide. The largest ships can ascend to Washington. A few miles above Washington the river forms a cataract 35 feet high; and between there and Westport it falls more than 1,000 feet. The scenery in this portion of its course is wild and beautiful, especially where it breaks through the Blue Ridge at Harper's Ferry. Its principal affluents are the Shenandoah, Cacapon, and Monocacy. The Potomac forms the greater part of the boundary between Virginia and Maryland.

POTOMAC, ARMY OF THE, a division of the United States army during the Civil War, which operated in the E. section of the country. It was organized

by Gen. George B. McClellan in 1861, and served under him in the Peninsular campaign and later in that of Antietam. General Burnside took command in 1862, and General Hooker in 1863. General Meade was in command when the victory at Gettysburg was won, in July, 1863, and continued in charge during General Grant's operations in 1864–1865.

POTOMAC, SOCIETY OF THE ARMY OF THE, a military organization founded in New York, July 5, 1869, and has held annual reunions since that date. All officers and soldiers who served in the Army of the Potomac and in the 10th and 18th Army Corps, Army of the James, are eligible to membership. The officers are a president, one vice-president from each army corps, and from the general staff; a treasurer, recording secretary, and corresponding secretary.

POTOSÍ, a city and capital of a department of same name; pop. abt. 30,000 (dept. 45,031 sq. m.; pop. abt. 550,000); one of the most famous mining towns of Bolivia. It is built on the side of the Cerro de Potosí (15,381 feet), at an elevation of 13,000 feet above the sea, and is thus one of the loftiest inhabited places on the globe. The public buildings include a handsome cathedral and a mint. The streets are steep and narrow, and there are no wagons or carriages, but only llamas and mules. The climate is very trying; all the four seasons may be experienced in one day, but usually it is bitterly cold, owing to the elevation. England and French manufactures are imported; and, as the country in the vicinity produces little or nothing, all supplies have to be brought from a distance. The industry of the place is limited to silver mining. The National Bank of Bolivia is situated here.

POT POURRI, a dish of various kinds of meat and vegetables cooked together. Also: 1. A mixture of rose leaves and various spices, kept in jars or other vessels as a scent. 2. A vase or bouquet of flowers used to perfume a room. 3. In music, a medley; a collection of various tunes linked together; a capriccio or fantasia on popular melodies. 4. A literrary composition made up of several parts put together without any unity of plot or plan.

POTSDAM, the chief town of the Prussian province of Brandenburg, and until the establishment of the republic the second residence town of the royal family of Prussia; on an island in the lake-like river Havel, 18 miles S. W. of Berlin. It is a handsome city, with broad streets, public gardens, adorned with statues of Prussian soldiers, and fine squares; a royal palace (1667–1701), in the park of which are statues of Frederick-William I., Alexander I. of Russia, etc. The garrison church, with a steeple 290 feet high, contains the tombs of Frederick-William I. and Frederick II.; and the Friedenskirche the tombs of Frederick-William IV. and the Emperor Frederick III. The Brandenburg Gate is a copy of Trajan's Arch at Rome. In the immediate neighborhood of the town are more than half a dozen royal palaces, as Sans-Souci (1745–1747), the favorite residence of Frederick the Great, surrounded by a splendid park and gardens; the palace of Friedrichskron, formerly the New Palace (1763–1770); Charlottenhof, built by Frederick-William IV. in 1826; the Marble Palace, the summer residence of the former Emperor William II.; and Babelsberg, the private property of the same prince. Potsdam has an observatory, and a cadet and other military schools. Its manufactories produce sugar, chemicals, harness, silk, waxcloth, beer, etc. Alexander von Humboldt was a native. Potsdam owes its creation as a town to the Great Elector, Frederick William, and to Frederick II. Prior to that period it was a fishing village, on the site of an ancient Slav settlement. Pop. about 65,000.

POTSDAM SANDSTONE, an American sandstone of Cambrian age, containing trilobites, *Lingula antiqua,* etc.

POT STONE, the name given in Norfolk, England, to certain large flints with a nucleus of chalk, found in the Upper Chalk. Also, an impure variety of soapstone or compact talc, formerly used for making utensils of various kinds.

POTTAWATTAMIES, a tribe of American Indians, belonging to the Algonquian stock. The early French settlers established a mission among them at Green Bay, and to this day many of them are Roman Catholics. They sided with the English during the Revolutionary War and in the War of 1812, and afterward settled in Kansas. They now number about 1,200.

POTTER, HENRY CODMAN, an American clergyman; born in Schenectady, N. Y., May 25, 1835. Educated in theology in Virginia, he became rector of Grace Church, New York City, in 1868; and was consecrated Protestant Episcopal bishop of New York in 1887. His works include: "Gates of the East: A Winter in Egypt and Syria" (1876); "Sermons of the City" (1881); etc. He died July 21, 1908.

POTTER, PAUL, a Dutch painter; born in Enkhuisen, Netherlands, Nov.

20, 1625; settled at The Hague, and painted cattle and landscapes, but was particularly successful in the former. One of his most celebrated pictures is "The Bull," at The Hague. He died in Amsterdam, Jan. 27, 1654.

POTTER, PAUL M., an American dramatist; born in Brighton, England, June 3, 1852; entered journalism and was foreign editor of the New York "Herald" in 1876–1883. Subsequently he turned his attention to the drama. His best-known works are "Our Country Cousins" (1893), a dramatization of "Trilby" (1895); and "Under Two Flags" (1901). He was the American representative at the Congress of Dramatic Art at the Paris Exposition in 1900.

POTTERY, the art of forming vessels or utensils of any sort in clay. This art is of high antiquity, being practiced among various races in prehistoric times. We find mention of earthenware in the Mosaic writings. The Greeks had important potteries at Samos, Athens, and Corinth, and attained great perfection as regards form and ornamentation. Demaratus, a Greek, the father of Tarquinius Priscus, King of Rome, is said to have instructed the Etruscans and Romans in this art. Glazed earthenware was long supposed to be of no older date than the 9th century of our era, and to have originated with the Arabs in Spain; but the discovery of glazed ware in Egypt, of glazed bricks in the ruins of Babylon, of enameled tiles and glazed coffins of earthenware in other ancient cities, proves that this is not the case.

The Arabs, however, seem to be entitled to the credit of having introduced the manufacture of glazed ware into modern Europe. The Italians set up their first manufactory at Faenza in the 15th century. In Italy the art was improved, and a new kind of glaze was invented, probably by Luca della Robbia. The French derived their first knowledge of glazed ware from the Italian manufactory at Faenza, and on that account gave it the name of *faïence*.

About the middle of the 16th century the manufactory of Bernard Palissy at Saintes in France became famous on account of the beautiful glaze and rich ornaments by which its products were distinguished.

A little later the Dutch began to manufacture at Delft the more solid but less beautiful ware which thence takes its name.

The principal improver of the potter's art in Great Britain was Josiah Wedgwood in the 18th century.

Porcelain or chinaware first became known in Europe about the end of the 16th century through the Dutch, who brought it from the East.

Porcelain or chinaware is formed only from argillaceous minerals of extreme delicacy, united with siliceous earths capable of communicating to them a certain degree of translucency by means of their vitrification. Porcelain is of two kinds, hard and tender. Both consist, like other earthenwares, of two parts—a paste which forms the biscuit, and a glaze. The biscuit of hard porcelain is composed of kaolin or china clay, and of decomposed felspar. The glaze consists of a felspar rock reduced to a fine powder, and mixed with water, so as to form a milky liquid into which the articles are dipped after a preliminary baking. Tender porcelain biscuit is made of a vitreous grit, composed of siliceous sand or ground flints, with other ingredients added, all baked together in a furnace till half-fused, and then reduced to a condition of powder. The glaze of tender porcelain is a specially prepared glass ground fine, and made into a liquid by mixing with water. The processes employed in manufacturing porcelain wares are very much the same as those used for other kinds of earthenware, but requiring more delicacy and care. The biscuit paste even of hard porcelain has so little tenacity compared with that of earthenware that it cannot easily be shaped on the wheel, and is consequently more frequently molded. The paste of tender porcelain is still less tenacious, so that the wheel cannot be used for it at all, and a little mucilage of gum or black soap must be added before it can be worked even in molds. During the baking, too, it becomes so soft that every part of an article must be supported. Tender porcelain receives two coats of glaze.

Metallic oxides incorporated with some fusible flux, such as borax, flint, etc., are used for painting on porcelain. The colors are mixed with essential oils and turpentine, and applied by means of a camel's hair brush. When the painting is finished the vessels are baked in a peculiar kind of ovens called "muffles," which are also used for fixing the printed figures on the glaze of stoneware. By the operation of the furnace most of the colors employed in painting porcelain become quite different, and the change which takes place in them is usually through a series of tints, so that the proper tint will not be obtained unless the baking is stopped precisely at the proper time. Sometimes porcelain has designs etched on it by means of fluoric

acid. Sculptures also are executed by casting in molds in various kinds of porcelain, called statuary porcelain, Parian, Carrara, etc.

The most celebrated ware of different times and countries are distinguished by distinctive names; as, Majolica-ware, Sèvres, Chelsea, Palissy, etc.; and of these, the latter—the work of Bernard de Palissy, who lived in the 16th century —deserves some special attention. Palissy, having resolved to discover a method of enameling stoneware, succeeded, after 16 years' efforts, and proceeded to manufacture pottery characterized by a peculiar style and many singular qualities. It is not decorated with flat painting, but with figures and ornaments, which are generally pure in form, and are all executed in relief and colored. The most remarkable of the works of Palissy are his "Pièces rustiques," a designation given by him to dishes ornamented with fishes, snakes, frogs, crayfish, lizards, shells, and plants, quite true to nature in form and color.

In the United States great progress has been made in producing fine pottery. Bennington, Vt., and Baltimore, Md., are famous for flint enameled ware,

POTTSTOWN, a borough in Montgomery co., Pa.; on the Schuylkill river, the Schuylkill canal, and the Pennsylvania, and the Philadelphia and Reading railroads; 40 miles N. W. of Philadelphia. It is the trade center of a large agricultural region. Here are a high school, public hospital, Hill School, street railroad and electric light plants, National bank, and daily and weekly newspapers. The borough has rolling mills, furnaces, foundries, railroad repair shops, and manufactories of iron castings, steel wheels, metallic axles, carriages, nails, boilers, agricultural implements, cigars, etc. Pop. (1910) 15,599; (1920) 17,431.

POTTSVILLE, a borough and county-seat of Schuylkill co., Pa.; on the Schuylkill river, and on the Philadelphia and Reading, the People's, the Pennsylvania, and the Lehigh Valley railroads; 93 miles N. W. of Philadelphia. Here are the court house and county jail, high school, public hospital, parks, street railroads, electric lights, waterworks, National and State banks, and several daily and weekly newspapers. The industries include important anthracite coal mines, large steel works, planing mills, a silk mill, and the shops of the Philadelphia and Reading Coal and Iron Company. Pop. (1910) 20,236; (1920) 21,876.

POUCHED MOUSE, *Dipodomys*, a genus of small, lean, long-tailed, agile rodents, with cheek-pouches. The best known species is *D. philippii*, from the waste regions of California, where it seems to find a sparse diet of seeds and roots, and in the dry season no drink but dew.

POUCHED RAT, *Pseudostoma* or *Geomys*, a genus of plump, short-tailed, hamster-like rodents, with cheek pouches which open externally and are used as receptacles for food. One of the best known species is *P.* or *G. bursarius*, sometimes called "gopher." Like the other species it is a native of North America, and inhabits the territory E. of the Rocky Mountains and W. of the Mississippi. It is a burrower like the mole, active in warm weather, hibernating in the cold, sluggish above ground. Being voracious gnawers, the pouched rats do much damage to the roots of trees and crops.

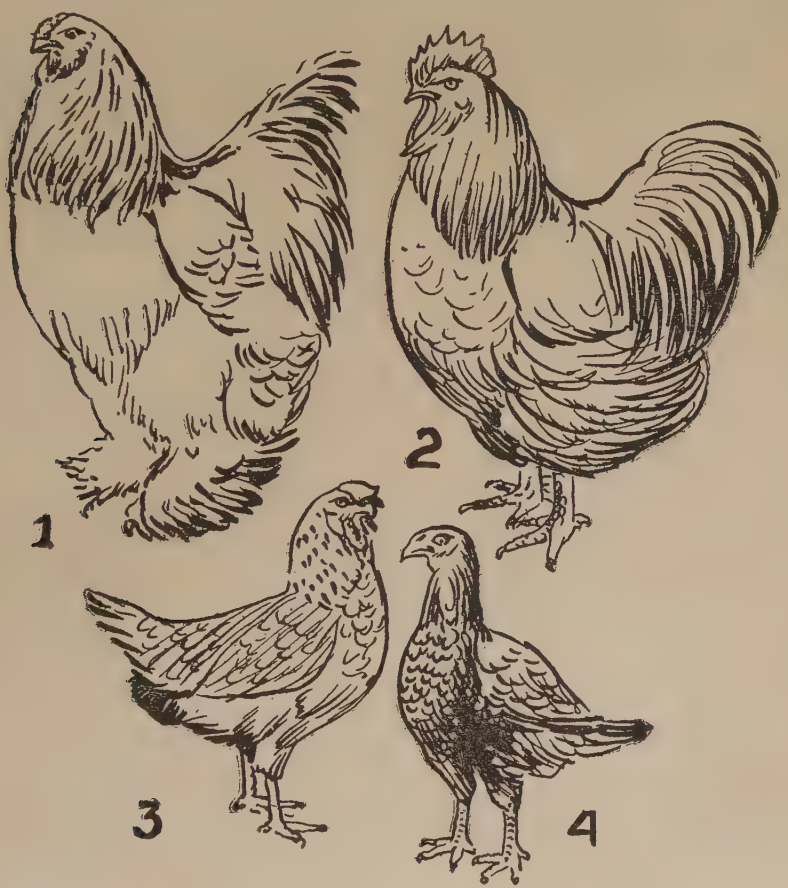
POUGHKEEPSIE, a city and county-seat of Dutchess co., N. Y.; on the Hudson river, and the Central New England, and the New York Central and Hudson River railroads; 75 miles N. of New York. It has daily steamboat connection with New York and Albany. The Hudson is here crossed by a celebrated cantilever bridge which was completed in 1889 at a cost of nearly $5,000,000. It is 7,100 feet long, has three cantilevers, and rests on six massive piers. Poughkeepsie is the seat of VASSAR COLLEGE (*q. v.*). Here are Riverview Military Academy, and other private educational institutions, parks, public library, orphan asylum, Home for Old Men, Home for Old Women, General Hospital, Hudson River Hospital for the Insane, court house, Home for the Friendless, National and private banks, electric lights and street railroads, and daily and weekly periodicals. Poughkeepsie has manufactories of iron, machinery, boots and shoes, leather, carpets, glass, shirts, silk goods, clothing, flour, earthenware, drugs, etc. The city was settled by the Dutch in 1698; during the Revolution it was the capital of New York. The State convention to ratify the National Constitution met here in 1788. Pop. (1910) 27,936; (1920) 35,000.

POULPE, a genus of *Cephalopoda*, of the order *Dibranchiata*, having eight feet or arms, nearly equal, united at the base by a membrane, and very long in proportion to the body. The arms are used for swimming in water, creeping on land, and seizing prey. Poulpes swim by contractions of the muscular web of the body, which extends upon the arms. Like other cephalopods, when alarmed or annoyed, they discharge an inky fluid.

POULSON, NIELS, an American manufacturer; born in 1843, in Denmark, and at the age of 21 came to the United States as an architect and builder in charge of a department in the New York Architectural Iron Works. In 1897 he entered business for himself, his firm being incorporated as the Hecla Architectural Iron Works. He interested himself in providing free technical instruction for his employees and also gave in 1910 the sum of $100,000 to maintain an exchange of professorships between the United States and Scandinavian countries. His fortune of $500,000 was left at his death to the cause of education.

POULTICE, a soft composition, as of bread, meal, bran, or a mucilaginous substance, to be applied to sores, inflamed parts of the body, or the like; a cataplasm.

POULTRY, a general name for all birds bred for the table, or kept for their eggs. The birds most commonly included under this designation are the common fowl, the peafowl, the guinea fowl, the turkey, goose, and duck. There is this great difference between the varieties of the domestic fowl, that some are disposed by constitution to continue laying throughout the whole season without sitting: while others after having laid from 12 to 15 eggs sit obstinately, and cease to lay. Among the breeds most in favor are those known as Dorking, Game, Rhode Island Reds, Hamburg, Cochin, Brahma, Scots Gray, Polish, Spanish, Leghorn, Plymouth Rock, Houdan, Minorca, etc. Hatching by artificial means has long been practiced in Egypt, and



POULTRY

1. Light Brahma
2. Buff Orpington
3. Brown Leghorn
4. Indian Game

artificial incubators are in general use in the United States and other countries.

POUNCE, a fine powder, such as pounded gums and arach and cuttlefish bonus, used to dry up the ink on a fresh written manuscript; now superseded in the United States by blotting paper, except in the case of parchment. The word is also applied to charcoal dust inclosed in some open stuff, as muslin, etc., to be passed over holes pricked in the work, to mark the lines or designs of a paper underneath. It is used to some extent by embroiderers to transfer patterns upon their stuff; also by fresco painters, sometimes by engravers, and in varnishing.

POUND, a unit of weight. Pounds are of different kinds, as pounds Troy (containing 12 ounces), pounds avoirdupois (containing 16 ounces), etc. A cubic inch of distilled water, at 62° F., the barometer being 30 inches, weighs 252.458 Troy grains, and the Troy pound is equal to 5,760 of these grains. The avoirdupois pound is equal to 7,000 Troy grains, so that the Troy pound is to the avoirdupois as 144 to 175. Pound is also the principal English coin of account, and corresponding to the "coin of circulation" called a sovereign, of the value of about $4.80. It is divided into 20 shillings or 240 pence, and weighs 123.27447 Troy grains (7.98805 grammes), as determined by the British Mint regulation, in virtue of which a mass of gold weighing 40 pounds Troy is coined into 1,869 sovereigns. The name is derived from the fact that in the time of the Conqueror, one Tower pound of silver was coined into 240 silver pence; whence the Tower pennyweight was really and truly the weight of a penny. The word is also applied to an inclosure, erected by authority, in which cattle or other beasts found straying are impounded or confined.

POUNDAL, a name sometimes used for the absolute foot pound second unit of force, which will produce in one pound a velocity of one foot per second, after acting for one second.

POUSHKIN, or **PUSHKIN** (pösh'kin), **ALEXANDER**, a Russian poet; born in Moscow, Russia, June 6, 1799. In 1817 he received a government appointment, but was banished for writing an "Ode to Liberty"; was recalled and restored to office in 1825. A portion of his works have been translated into German, French and English. He wrote "Ruslan and Lindmilla"; "Fountain of Bakhtchisarai"; "Robber Brothers"; "Count Nuhm"; "Poltava"; "The House in Kolomna"; "Boris Godunoff"; "Eugene Onyegin." Among his novels are: "The Captain's Daughter"; and "The Queen of Spades." He died in St. Petersburg, Feb. 10, 1837.

POUTER, a variety of fancy pigeon, the chief character of which is its very projecting breast.

POWAN (*Coregonus clupeoides*), a fish inhabiting Loch Lomond, in Scotland, and also known as the fresh-water herring.

POWDER. See GUNPOWDER.

POWELL, JOHN WESLEY, an American geologist; born in Mount Morris, N. Y., March 24, 1834. He was educated at Oberlin College; was a lieutenant-colonel of artillery at the close of the Civil War; professor of geology in the Illinois Wesleyan University, 1865; explored the cañon of the Colorado river in 1867 and in 1870–1874. He was director of the United States Geological Survey in 1879–1896, and of the United States Bureau of Ethnology after 1879. The special volumes of reports written by Major Powell are: "Exploration of the Colorado River in 1869–1872" (1875); "Geology of the Uinta Mountains" (1876); "The Arid Regions of the United States" (1879); "Introduction to Study of Indian Languages" (1880); "Cañons of the Colorado," etc. He died in 1902.

POWELL, MAUD, an American violinist; born in 1868 in Peru, Ill., she studied music first in Chicago. In 1880 she entered the Leipzig Conservatory, and later studied at Paris and Berlin. At a concert of the Berlin Philharmonic Society in 1885, she made her début as a violinist, and from that time she was one of the acknowledged masters of the violin. She returned to the United States after having gained recognition abroad and was given triumphant receptions everywhere. She excelled all violinists in the number of new compositions written for the violin, and in her ability to successfully introduce novelties into her programs. She died in 1920.

POWER, the product arising from the multiplication of a quantity or number into itself. The first power of any quantity or number is the quantity or number itself; the second power is the square or product of the quantity or number multiplied by itself; the third power is the cube or product of the square of the quantity or number multiplied by the original quantity or number; this again multiplied by the original quantity or number is the fourth power. Thus the powers of a are a (or a^1,), a^2, a^3, a^4, that is $a \times a$ (a^2), $a^2 \times a$ (a^3), etc. The

figures ^{2}, ^{3}, ^{4}, etc., denoting the powers of the quantities, are called exponents or indices. Powers which have fractional and negative indices are termed fractional and negative powers respectively.

In mechanics: That which produces motion or force; that which communicates motion to bodies, changes the motion of bodies, or prevents the motion of bodies; a mechanical agent or power. Force or effect considered as resulting from the action of a machine.

In law: (1) A term employed to denote a reservation to either party in a covenant enabling him to do certain acts regarding the property conveyed. (2) An authority given by one party to another to act for him or to do certain acts, as to make leases, etc.

In optics, the magnifying or diminishing capacity of any lens or set of lenses. By ellipsis the word is used for the lens itself.

POWERS, HIRAM, an American sculptor; born in Woodstock, Vt., July 29, 1805. While still a boy he went to Cincinnati, O., where he became an apprentice to a clockmaker. Subsequently he was employed for seven years making wax figures and fitting them with machinery for the Cincinnati museum. In 1835 he went to Washington, where he executed the busts of several distinguished persons. Two years later he was enabled to go to Italy to study his art, and he resided in Florence till his death. There he produced his statue of "Eve," and in 1843 the "Greek Slave"; "Fisher Boy" (1846). Among the other works the chief were "Proserpine," "Il Penseroso," "California," "America," and busts of Washington for the State of Louisiana, of Calhoun for South Carolina, and Daniel Webster for Boston, as well as those of other distinguished Americans. He died in Florence, Italy, June 27, 1873.

POWHATAN, an Indian chief; born about 1550; was the father of Pocahontas, who is celebrated in the colonial history of Virginia as the rescuer of John Smith. He died in April, 1618.

POWHATAN, the name of an Indian confederacy, which at an early day lived on the E. shore of Virginia and a portion of Maryland. They at first numbered only seven tribes, but under the leadership of their chief, Powhatan, increased to 30. The English found them when forming the colony at Jamestown. Constant troubles between the confederacy, the English, and the Iroquois, soon destroyed nearly all the Powhatan tribes, and after 1684 they were not recognized as a separate nation.

POYNINGS' LAW, or the Statute of Drogheda, an act of the Irish Parliament, passed in 1495, whereby all general statutes before that time made in England were declared of force in Ireland. It was so named from Sir Edward Poynings, deputy of Ireland under Henry VII. in 1494, when he suppressed the revolt of Perkin Warbeck.

POYNTER, SIR EDWARD JOHN, an English painter; born in Paris, March 20, 1836; educated at Westminster School and Ipswich Grammar School; received his art training at the Royal Academy and under Gleyre in Paris; gained a reputation by his "Israel in Egypt," exhibited in 1867, and "The Catapult" (1868); painted the cartoons for the mosaic of St. George in the Westminster Palace (1869). Among his chief pictures are "Perseus and Andromeda" (1872); "The Golden Age" (1875); "Atalanta's Race" (1876); "Diadumene" (1885); and "A Roman Boat Race" (1889). He was elected an Associate in 1869 and a Royal Academician in 1876, was the first Slade Professor of Art at University College, London, and was director for art at South Kensington for some years. He became president of the Royal Academy and was knighted in 1896. He died in 1919.

POZAREVATZ, a city in Serbia, 34 miles S. of Belgrade, and 8 miles S. of the Danube. Has few industries except agriculture, but is the trade center of the Morava Valley. Has a penitentiary with a house for political offenders, and a women's prison. Scene of treaty in 1718 between Turkey and Austria. Figured in World War, being captured by German-Austrian forces in 1915. Pop. about 15,000.

POZIÈRES, a village in France, near the river Ancre and the Belgian border, on the high road between Amiens and Cambrai, which figured as scene of much fighting in the early period of the World War. The village had at first been taken by the Germans, but during the battle of the Somme, in the summer of 1915, Australian regiments took it from the Germans. It changed hands repeatedly during the war.

POZSONY, Hungarian name for PRESSBURG (*q. v.*).

POZZUOLI, the ancient Puteoh, a city and seaport of southern Italy, 6 miles W. S. W. of Naples, on the shore of the bay of Baiæ, the N. W. portion of the Bay of Naples. The coast forms a natural harbor, and a considerable trade and an active fishing is carried on.

Pozzuoli was founded by the Greeks about 520 B. C., and became under Rome a great center of commerce. St. Paul landed here in the course of his journey to Rome. Pozzuoli was destroyed by the Goths more than once, rebuilt by the Byzantine Greeks, and finally devastated by earthquakes and volcanic eruptions. It abounds in ancient ruins. The cathedral stands on the site of a temple of Augustus. A ruined temple of Serapis also remains, inclosed by 48 marble and granite columns. On an eminence behind the town stands the ruined amphitheater, resting on three series of arches. In the neighborhood are Lake Avernus, the Grotto of the Sibyl, the baths of Nero, the ruins of Baiæ and Cumæ, etc.

PRÆCIPE, a writ commanding something to be done, or demanding a reason for its non-performance. The term is now only used to denote the note of instructions delivered by a plaintiff or his attorney to the officer of the court, who stamps the writ of summons.

PRAED, MRS. CAMPBELL MACKWORTH (ROSE CAROLINE MURRAY-PRIOR), an Australian novelist, born in Bromelton, Queensland, March 27, 1851. In 1876 she went to London. Her most popular works are: "An Australian Heroine" (1880); "Moloch" (1883); "The Head Station" (1885); "Outlaw and Lawmaker" (1893); "Nulma" (1897). In collaboration with Justin McCarthy, "The Right Honorable" (1886), and "The Ladies' Gallery" (1889), novels of political and social life.

PRAED, WINTHROP MACKWORTH, an English poet; born in London, July 26, 1802. He was educated at Eton and Trinity College, Cambridge, where he obtained for two years in succession the chancellor's prize for an English poem. He contributed both in prose and verse to "Knight's Quarterly Magazine." In 1829 he was called to the bar, and in 1830 and 1831 was returned for St. Germans to Parliament, where he opposed the Reform Bill. He sat subsequently as member for Yarmouth, and Aylesbury, and became ultimately recorder of Barnstaple and deputy high-steward for the University of Cambridge. His poems are mostly of a light and elegant character, belonging to the class known as *vers de société*. He died in London, July 15, 1839.

PRÆFECT, a common name applicable to various Roman functionaries. The most important was the *Præfectus urbi*, or warden of the city, whose office existed at an early period of Roman history, but was revived under Augustus, with new and greatly altered and extended authority, including the whole powers necessary for the maintenance of peace and order in the city, and an extensive jurisdiction civil and criminal. The *Præfectus prætorio* was the commander of the troops that guarded the emperor's person.

PRÆTOR, originally the official title of the Consuls at Rome. When the patricians were compelled to acquiesce in the consulship being thrown open to the plebeians, they stipulated that a new curule magistrate should be appointed from the patricians exclusively, to act as supreme judge in the civil courts. On this magistrate the title of prætor was bestowed.

PRÆTORIAN GUARD, a body of permanent troops, established by Augustus as Imperial Life Guards. The prætorian guards were kept up by successive emperors, and, being under special organization and enjoying several privileges, they became in time so powerful that they were able to raise and depose emperors at their will. They were reorganized by Septimius Severus, and were finally suppressed by Constantine the Great.

PRAGMATIC SANCTION, a rescript or answer of the sovereign delivered by advice of his council to some college, order, or body of people, on any case of their community. By the French the term was appropriated to certain statutes limiting the jurisdiction of the Pope, as in A. D. 1268 and 1438. Pope Leo X., in 1545, persuaded Francis I. to exchange them for a concordat. Generally it is applied to an ordinance fixing the succession to a throne in a certain line. Thus, by the Pragmatic Sanction of Germany in 1439, the succession of the empire was made hereditary in the house of Austria, and in 1724 the Emperor Charles VI., being without male issue, published another, settling the succession upon his daughter, Maria Teresa and her issue.

PRAGMATISM, a term used to designate those who follow the system of thought marked out by Professor William James of Harvard University. The central thesis of the philosophy is that objective truth can not be discovered by the intellect, but instead of worrying about discovering and disputing about matters that are no longer vital, the more useful task is to see what attitude will be most serviceable in solving the problems of today. A man reveals his philosophy by the way in which he works out the practical questions which every day confront him. The criterion then of the rightness of wrongness of a given theory of philosophy is the question how

does it work. Is it a useful solution of the difficulties we face? Does it bring pleasure or pain? It is the answers to these questions that will determine the truth or falsity of the idea, not whether it can, in strict logic, be proved the truth. Hence James and his school are credited with having served philosophy by saving it from dry-as-dust platitudes and once more bringing it to bear upon our active life and thought. Since James' death the logic of pragmatism has been developed by Professor John Dewey, formerly of the University of Chicago, now of Columbia University. It has its champions abroad as well as in America, and has created a popular interest in philosophy.

PRAGUE, the capital of Bohemia, and situated at the base and on the slope of the hills which skirt both sides of the isleted Moldau. It offers a highly picturesque appearance from the beauty of its site, and the numerous lofty towers (more than 70 in number) which rise above the many noble palaces, public buildings, and bridges of the city. The royal Burg, on the Hradschin, the ancient residence of the Dukes of Bohemia, dates mainly now from the 16th and 17th centuries, and has 440 rooms. In the neighboring cathedral of St. Vitus (1344) are the splendid royal mausoleum (1589) and the shrine (1736) of St. John of Nepomuk containing 1½ tons of silver. Of 47 other Catholic churches the chief are the domed Jesuit church of St. Nicholas, with its lavish decorations, and the Teyn Church (1407), the old Hussite Church, with the grave of Tycho Brahé, and its marble statues of the Slavonic martyrs, Cyril and Methodius. Of five bridges and two railway viaducts the most striking is the Karlsbrücke (1357–1503), 543 yards long, with gate-towers at either end, and statues of John of Nepomuk and other saints. Other noteworthy objects are the town hall (1381–1884), the Pulverturm (1475), and the Premonstratensian monastery of Strahow. Prague has, besides, numerous public gardens and walks in the suburbs, with several royal and noble parks open to the public in the vicinity of the city. The university, founded in 1348, had 10,000 students at the beginning of the 15th century. It possesses a library of 195,000 volumes, a fine observatory, museums of zoölogy and anatomy, a botanical garden, etc. The manufactures include machinery, chemicals, leather, cotton, linen, gloves, beer, spirits, etc. Prague is the great center of the commerce of Bohemia, and the seat of an important transit trade.

History.—Prague was founded by German settlers about 1100. In the 14th century its munificently endowed university brought foreigners to it from every part; but in 1424 Prague was conquered and almost destroyed by the Hussites. In the Thirty Years' War it suffered severely, and in 1620 the battle was fought at the Weissenberg, near the city, in which the Elector-Palatine, Frederick V., was completely defeated, and compelled to renounce his assumed crown. Swedes and Imperialists successively gained possession of the town during the war; and a century later it again fell into the hands of different victors, having been compelled in 1744 to capitulate to Frederick the Great, who here on May 6, 1757, defeated 60,000 Austrians under Prince Charles of Lorraine. From Napoleon's downfall, Prague has made rapid strides, and enjoyed prosperity and quiet, except in 1848, when the meeting of the Slavonic Congress within its walls called forth such strongly marked democratic demonstrations on the part of the supporters of Pan-Slavism that the Austrian Government dissolved the conclave and bombarded the town to restore quiet. In 1866 Prague was occupied bloodlessly by the Prussians, who here on Aug. 23, concluded a treaty with Austria. The Republic of Czecho-Slovakia was proclaimed Oct. 28, 1918, and Prague became its capital. Pop. about 650,000.

PRAGUE, UNIVERSITY OF. There are two universities in Prague, a German and a Czech university. The former is the older of the two, it being the oldest of the German universities. Founded in 1348, with the four faculties of theology, law, medicine, and arts, it gained the attention of all Europe when, in 1403, John Huss became the rector. During the period of the Hussite wars the university took on a distinctly Czech character, the German students withdrawing and founding the University of Leipzig. When, however, the Catholics and Germans secured the upper hand in Bohemia, as they did in the Thirty Years' War, the university came under the control of the Jesuits and a decided reaction against the Czechs took place. With the growth of the spirit of nationality in the nineteenth century the Czech influence again made itself felt, and finally led to the founding of a separate University of Prague in 1882 with faculties of law, medicine and arts. As might be expected the new university rapidly outgrew the old one, as the population is predominately Czech. In 1919 at the opening of the World War the students in the Czech university numbered 7,051 while the German institution had 3,043.

PRAIRIE, the name given by the early French settlers in America to extensive tracts of land, either level or rolling, destitute of trees, and covered with coarse tall grass, interspersed with numerous varieties of flowering plants.

PRAIRIE CHICKEN, the popular name of the pinnated grouse of the United States (*Tetrao cupido*).

PRAIRIE DOG, a name given to either of the two species of Cynomys, but especially to *C. ludovicianus*, from the fancied resemblance of its cry to the bark of a small dog, whence it has been also called the barking squirrel. It is about a foot long, reddish-brown above, lighter beneath. Its habits are eminently

PRAIRIE DOG

social; it forms large communities on the prairies, each burrow having a little hillock at its entrance, and excavated passages connect the burrows, which are sometimes shared by the burrowing owl.

PRAIRIE WOLF, or COYOTE (*Canis latrans*), the small wolf which is found on the prairies in North America, believed by many to be a mere variety of the European wolf. It is a cowardly animal, and only dangerous to man when in packs and pressed by hunger.

PRASE, in mineralogy: (1) A dull leek-green chalcedony, owing its color to the presence of exceedingly fine granular chlorite. (2) A green crystallized quartz found at Breitenbrunn, Saxony; the color is due to inclosed fine filaments of green asbestiform actinolite.

PRATO, often called PRATO IN TOSCANA, a walled town of Italy, 10½ miles S. E. of Pistoia and 11 N. W. of Florence; has a citadel and a cathedral with frescoes by Filippo Lippi, though the see has been united with that of Pistoia since 1653. There are manufactures of straw plait, cloth, and paper works. Pop. about 20,000.

PRATT, BELA LYON, an American artist and sculptor. Born at Norwich Conn., in 1867 and died in 1917. He studied at the Yale School of Art and later under St. Gaudens. Among his most successful monuments are "Soldiers and Sailors Monument" (Malden, Mass.), "Spanish War Soldier" (St. Paul's School, Concord, N. H.) and the "Army Nurses Memorial" (State House, Boston). He also modelled the figures "Science" and "Art" in the Boston Public Library and the figure "Philosophy" in the Congressional Library.

PRATT, CHARLES, an American philanthropist; born in Watertown, Mass., Oct. 2, 1830; removed to New York in 1850, and engaged in the oil business, his firm being eventually merged in the Standard Oil Company. He amassed a great fortune, took an intense interest in educational matters, and founded in Brooklyn the Pratt Industrial Institute. He died in New York City, May 4, 1891.

PRATT, ORSON, a Mormon educator; born in Hartford, N. Y., Sept. 19, 1811; became one of the 12 apostles of the Mormon Church (1835), and was in charge of European missions from 1840, many successive years. He was Professor of Mathematics in Deseret University; also church historian and recorder. His writings include: "Divine Authenticity of the Book of Mormon" (1851); "Patriarchal Order, or Plurality of Wives" (1853); "Cubic and Biquadratic Equations" (1866). He died in Salt Lake City, Oct. 3, 1881.

PRATT INSTITUTE, a coeducational non-sectarian institution in Brooklyn, N. Y.; founded in 1887. Reported at the close of 1919: Professors and instructors, 148; students, 4,743; president, F. B. Pratt.

PRAWN, in zoölogy, *Palæmon serratus*, and, less properly, any other species of the genus. Its ordinary length is about four inches; color bright gray, spotted and lined with darker purplish gray. It is a favorite article of food, and is found in vast numbers in the North Atlantic.

PRAXITELES, a celebrated Greek sculptor; born about 360 B. C., who executed several fine statues, in bronze and marble, of Bacchus, a satyr, Venus, and Apollo. An ancient copy of one of his works, the "Apollo Sauroctonos," is the only example extant. Phryne, the celebrated Thespian courtesan, was his mistress, and served as the model for his statues of Venus. Two of his sons acquired fame as sculptors. He died about 280 B. C.

PRAYER, a universally acknowledged part of the worship due to God; not merely petition, but, according to the New Testament models and Christian

usage, praise, adoration, confession of sin, and thankful acknowledgment of mercies received, which seems almost necessarily to follow from a belief in the existence of a god. We find it both where the object of worship is one Supreme Being and in polytheism.

Forms of prayer for public use grew up in the earliest times, naturally and inevitably: the Lord's Prayer being doubtless regarded as a warrant and a model.

Prayer for the dead, in the Roman Catholic, Greek, and other Oriental churches, is offered with the intention and expectation of obtaining for the souls of the deceased an alleviation of their supposed sufferings after death on account of venial sins, or of the penalty of mortal sins, remitted but not fully atoned for during life. The practice of praying for the dead is usually associated with the doctrine of purgatory, or with the belief in a progressive intermediate state. It seems certain that some such doctrine existed in most of the ancient religions. Its existence among the Jews is attested by the well-known assurance in II Maccabees, chap. xii., that "it is a holy and wholesome thought to pray for the dead, that they may be loosed from their sins." Catholics contend that the doctrine as well as the practice is equally recognizable in the early Christian Church. They rely on the parable of Lazarus and the rich man (Luke, xvi: 19–31), as establishing the intercommunion of this earth with the world beyond the grave. The liturgies, too, of all the rites without exception contain prayers for the dead; and the sepulchral inscriptions from the catacombs, which reach in their range from the 1st to the 5th century, contain frequent prayers in even greater variety. In the services of the mediæval and later Church prayers for the dead form a prominent and striking element. The Protestant churches without exception repudiated the practice. In the burial service of Edward VI.'s "First Common Prayer Book" some prayers for the deceased were retained; but they were expunged from the "Second Book"; and no trace is to be found in that sanctioned under Elizabeth. Still it is not expressly prohibited.

In the United States the sect called "Christian Scientists," founded by Mrs. Mary Baker G. Eddy, believes in the efficacy of prayer to heal disease. See CHRISTIAN SCIENCE.

PREACHING, the act of preaching; a public religious discourse. The modern system of preaching was unknown in the early Church. The general mode then was for the priest to read portions of the Old or New Testament, and explain or enforce the precepts which they contained. Generally, sermons were delivered whenever the Scriptures were read, and sometimes several, by different persons at the same meeting.

About the 13th century, the scholastic divines directed their chief attention to the study of the sacred Scriptures, and were hence called Bible divines. They introduced a new and artificial mode of preaching, called declaring. Before this time, the clergy generally adopted postulating, or expounding a large portion of Scripture, sentence by sentence. By the new method, the preacher read a text out of some book and chapter of the Old or New Testament, dividing it into several parts and expounding them. The opposition to this textual mode of preaching continued for upward of a century, but at length it came generally to prevail. The divisions or parts of a modern sermon are usually the introduction, the proposition, the illustration, and the application.

PREADAMITISM, the teaching of Isaac de la Peyrère (1592–1676), a French Calvinist, who asserted that Paul had revealed to him that Adam was not the first man created. Peyrère published a treatise in 1655, based on Romans v: 12–14, but it was publicly burnt, and he was imprisoned at Brussels. His views, however, were espoused by many people.

PREBEND, the stipend or maintenance granted to a canon of a cathedral or collegiate church out of its estate; a canonry in England. A simple prebend is one restricted to the revenue only; a dignitary prebend has jurisdiction annexed to it.

PREBLE, EDWARD, an American naval officer; born in Portland, Me., Aug. 15, 1761; crossed the ocean to Europe in an American privateer in 1777; served as midshipman in the "Protector" in 1779; was captured and imprisoned for some time in the prison-ship "Jersey"; was promoted captain in 1799, in which year he commanded the "Essex" in the East Indies for the protection of American interests. Early in 1803 he was made commander of the "Constitution"; and in June of that year was placed in command of a fleet sent against Tripoli. He greatly distinguished himself in causing that country to sue for peace, a feat accomplished by a number of skillful bombardments. He returned to the United States and received through Congress the thanks of the nation and a gold medal. He died in Portland, Me., Aug. 25, 1807.

PRECEDENCE, the order in which men and women follow each other according to rank or dignity in a State procession or on other public occasions. In England the order of precedence depends partly on statutes, and partly on ancient usage and established custom. The sovereign is always first in order of precedence, after whom follow the Prince of Wales, sons of the sovereign, grandsons of the sovereign, brothers of the sovereign, uncles of the sovereign, the sovereign's brothers' or sisters' sons, the Archbishop of Canterbury, the Lord High Chancellor, and so on through the high state dignitaries, the various ranks of the peerage, etc. The order of precedence among women follows the same rules as that among men. By the acts of Union of Scotland and Ireland the precedence in any given degree of the peerage has been established as follows: (1) Peers of England; (2) Peers of Scotland; (3) Peers of Great Britain; (4) Peers of Ireland; (5) Peers of the United Kingdom and Peers of Ireland created subsequent to the Union.

PRECEDENT, a judicial decision, interlocutory or final, which serves as a rule for future determinations in similar cases; also a form of proceeding to be followed in similar cases.

PRECENTOR, an officer in a cathedral, formerly sometimes called chaunter, and ranking in dignity next to the dean. His stall is on the opposite (N.) side of the choir, and that side is called *cantoris* side, the side of the cantor, as the other is called *decani*, the side of the dean. He has the direction of the musical portion of the service. The precentor is, in cathedrals of the new foundations, a minor canon, and is removable by the dean and chapter.

PRECEPTORY, a religious house of the Knights Templars, subordinate to the Temple, or principal house of the order in London, under the government of an eminent knight. The preceptories of each province were subject to a provincial superior, three of whom ranked above all the rest, viz., those of Jerusalem, Tripolis, and Antioch.

PRECESSION OF THE EQUINOXES, in astronomy, the going forward of the equinoxes. The arrival of the sun at the point Aries a little earlier than he might be expected to reach it was first observed by Hipparchus about 150 B. C. Depending, as the phenomenon does, for its explanation, on the law of gravity, Hipparchus could not account for it. Sir Isaac Newton was the first who did so, and that his newly discovered law of gravitation explained the precession of the equinoxes was a confirmation of the accuracy with which he had read the law itself. Excepting only at the two equinoxes, the plane in which the sun moves in his orbit and that in which the earth rotates do not coincide. By the law of gravitation one body does not attract another in mass, but acts on its separate particles. The sun then does not attract the earth as a whole, but tends to pull the parts nearest it away from those in proximity to the center, and the center again away from those on the other side. The bulged-out equatorial zone is specially liable to be thus acted upon, and, but for the rotation of the earth, would be so drawn down toward the ecliptic that it and the equator would ultimately be in one plane. The earth's rotation, however, modifies this action, and simply causes the points at which the earth's equator intersects the plane of the ecliptic to move slowly in a direction opposite to that in which the earth rotates. This is what is denominated the precession of the equinoxes. It is generally associated with the sun, but the moon is twice as potent in producing it; owing to her comparative nearness to the earth she is able to produce a greater differential effect on the nearer and more remote portions of our planet.

PRECIOUS METALS, gold and silver, so called on account of their value.

PREDESTINATION, the act of ordaining, decreeing, or determining events beforehand. In theology, foreordination. The word "predestination" does not occur in the authorized version of the Bible.

PREDICATE, in grammar, the word or words in a proposition which expresses what is affirmed or denied of the subject. In logic, the term in a proposition, expressing that quality which, by the copula, is affirmed or denied of the subject.

PRE-EMPTION, the act or right of buying before others. Also, the right of a settler on lands to purchase in preference to others, when the land is sold.

PRE-EXISTENCE, existence previous to or before something else. Also, existence in a previous state; existence of the soul previous to its union with the body. Pre-existence was a doctrine of the Pythagoreans, and several others of the old philosophers, and is still found in many of the Eastern religions.

PREFECT, a governor, a commander, a chief magistrate; specifically, a title given to several officers, military, naval, and civil, in ancient Rome. Thus, in the

times of the kings the officer appointed by the king to act as his deputy when he was compelled to leave the city was called the *Præfectus urbi*, or prefect of the city. Later, during the earlier ages of the republic, when both consuls were required for military service, a *Præfectus urbi* was named by the Senate to act during their absence. In times of dearth or famine a commissioner was appointed to procure supplies, his official title being *Præfectus annonæ*, or prefect of corn. In war the whole body of the cavalry was under the command of an officer, also styled a prefect. The captain of a ship of war was called *Præfectus navis*, and the admiral of a fleet *præfectus classis*. Under Constantine the prefectus became governors of provinces. In France a préfect is the civil governor of a department, having control of the police and extensive powers in regard to municipal administration.

PREGNANCY, the quality or state of being pregnant or with child; the state of a female who has conceived or is with child.

PRELATE, an ecclesiastical dignitary of the highest order, having authority over the lower clergy, as an archbishop, or patriarch; a dignitary of the church.

PRELUDE, something introductory or preparatory to that which follows; an introductory or preparatory performance; an introduction. In music, a movement played before, or an introduction to a musical work or performance; a short introductory strain preceding the principal movement, performed on the same key as, and intended to prepare the ear for, the piece that is to follow.

PREMONSTRATENSIAN, in Church history, Norbertines; an order of regular canons, founded by St. Norbert, in 1119. The rule was that of St. Austin, and their founder imposed upon his subjects perpetual fasting and entire abstinence from meat. The order flourished greatly, and at one time, according to Hélot, there were more than 1,000 abbeys.

PRENDERGAST, EDMOND FRANCIS, archbishop of the Roman Catholic church, diocese of Philadelphia. Born in 1843 in Ireland and died in Philadelphia in 1918. When sixteen years of age he came to the United States and entered St. Charles Seminary, Overbrook, being admitted to the priesthood in 1865. After having several important parishes he became vicar-general of the archdiocese in 1895 and auxiliary bishop two years later. He became archbishop in 1911.

PREPOSITION, a part of speech, so named because originally prefixed to the verb, in order to modify its meaning. Prepositions are either simple or compound. Simple prepositions are at, by, for, from, in, on, out, to, up, with; compound prepositions are across, after (a comparative from of), against, above, about, along, amid, amidst, among, athwart, but, into, over, through, toward, until, unto, within, without. The prepositions concerning, during, except, notwithstanding, outtake, etc., arise out of a participial construction.

PRE-RAPHAELISM, an English school of painting. It was their object to oppose that system of art which had grown up since the time of Raphael; one of the main characteristics of which was the pursuit of beauty at the expense of truth.

PRE-RAPHAELITE BROTHERHOOD, an association founded in 1848 by Willian Holman Hunt, John Everett Millais, and Dante Gabriel Rossetti.

PRESBYTER, an elder, or a person advanced in years who had authority in the early Christian Church (I Peter v: 1). Also, in the Presbyterian Church, a member of a presbytery; specifically, a minister.

PRESBYTERIAN CHURCH, a name applied to those Christian denominations, who hold that there is no order in the Church as established by Christ and his apostles superior to that of presbyters (see PRESBYTER), and who vest church government in presbyteries, constituted of ministers and elders, possessed of equal powers thus without superiority among themselves. Presbyterianism does not recognize the term bishop as the superior of the presbytery, because these two names or titles in the New Testament, are used interchangeably of the same persons. Presbyterians hold that the authority of their ministers, is derived from the Holy Spirit, which is symbolized by the imposition of the hands of presbytery collectively. They affirm that all Christian ministers being ambassadors of Christ, are equal by their commission. The congregation elects its own minister and elders, and also its deacons and trustees—the former of the last two takes charge of the charities of the church, and the latter of its temporal or financial affairs. The session, consisting of the minister and elders, has the spiritual oversight of the church members. The Presbytery is constituted by ministers and elders in equal numbers. A congregation for the time without a pastor, can be represented in the presbytery by an elder. An appeal may be

made by the presbytery from congregations or sessions. A synod consists of a number of presbyteries within defined boundaries. The General Assembly is the highest court of the church, and consists of representatives from all the presbyteries; each minister is accompanied by an elder from the same presbytery.

The church government by elders or presbyters was in existence among the children of Israel when in bondage in Egypt (Ex. iii: 10). They were rulers and also representatives of the people, and as such under varied conditions were recognized during the entire history of the Jewish Church, including the time between the close of the prophetic period and the coming of Christ. Then, as was natural, a similar order of rulers thus derived, passed, informally, over into the Jewish Christian Church at Jerusalem, and as such was adopted (Acts xi: 30). The same order of church government was introduced by Paul and the other apostles into the churches composed of converted Gentiles. That order of church government in Old Testament times was recognized as of Divine authority, which character Presbyterians believe it did not lose when transferred and adopted by the primitive Church. The Presbyterian polity is democratic—republican, as the church members elect their own officials and are thus able to utilize their best men.

The first Presbyterian Church in modern times was founded in Geneva by John Calvin, about 1541; and the constitution and doctrines were thence introduced, with some modifications, into Scotland by John Knox, about 1560, though the Presbyterian was not legally recognized as the national form of church government till 1592. For nearly a century after this date, there was a continual struggle in Scotland between Episcopacy and Presbyterianism; till ultimately by the Treaty of Union in 1707, it was agreed on the part of England and Scotland that that form of church government should be the national form of ecclesiastical government in Scotland, and that the Scotch Church should be supported as the only one established by law. Besides the Established Church of Scotland, there are other important religious bodies whose constitution is strictly Presbyterian, but who, from conscientious scruples, decline being connected with, or receiving any emoluments from the state. The chief of these are the Free Church and the United Presbyterian Church.

Shortly after the Reformation Presbyterianism was in considerable strength in England, a large number of the Puritans preferring that system of government to episcopacy; but owing to the arbitrary measures of Cromwell, it subsequently declined in strength. There were in the British Isles, in 1640, three Confessions of Faith, the Scottish, the Irish, and the Thirty-nine articles of the Church of England—the English Presbyterians had not formed a confession. The sentiment began to prevail in Protestant circles, that there should be formulated for the whole kingdom a Confession of Faith in which all could unite, the Presbyterians taking the lead desired to have summoned "an assembly of divines and learned laymen under the protection of Parliament, who should be free in its action from the domination of the prelates." "A Grand Remonstrance" numerously signed by prominent men was presented to Charles I. (1641), asking him to summon such an assembly. He refused the request. Soon after Parliament, on its own responsibility, issued directions for selecting the members of the proposed assembly. They were enjoined to meet in Westminster, on July 1, 1643. On the same day King Charles issued a proclamation forbidding the assembly to meet, which, however, it did. There in that place a session was held by the assembly which continued for three years, during which time long conferences and discussions were held at intervals. Thus was formulated the Westminster Confession of Faith around which Presbyterians have rallied for more than 250 years. The assembly consisted of 121 divines; 10 noblemen; 20 from the House of Commons—there were only 10 or 12 independents or Congregationalists in the assembly. The Scotch Presbyterian Church also sent commissioners.

Soon after the Restoration episcopacy, which had been displaced as the state church, was restored, and about 2,000 Presbyterian clergy were ejected from their cures in consequence of the Act of Uniformity, which came into force Aug. 24, 1662. Presbyterianism has ever since been simply one of the forms of dissent in England, and has held no prominent position, though many Presbyterian churches are scattered throughout England. Of these by far the greater number are united to form a single body, the Presbyterian Church of England. There sprang up in England a few congregations connected with the Church of Scotland and with what was formerly known as the "Secession Church," now the United Presbyterian Church. The number of such afterward very much increased. At the time of the formation of the Free Church of Scotland the

greater number of the English Presbyterian churches connected with the Church of Scotland sympathized with the cause of the Free Church, and took the name of the Presbyterian Church in England. In 1876 a union, which had been long desired, was consummated between the synod more intimately related to the Free Church of Scotland and the congregations belonging to the United Presbyterian Church. The name assumed by the united church is the Presbyterian Church of England. At the time of the union the Presbyterian Church in England had about 150 churches, and the United Presbyterian Church more than 100. At the same date the Church of Scotland in England had about 20 congregations.

The first Presbyterians in America were emigrants from the British Isles, and the first Presbyterian church in America was founded in the colony of Massachusetts in 1629. It was the outgrowth of a Presbyterian congregation that landed there in 1625. This movement was projected by Presbyterian leaders in the S. of England and also in London. It was designed to be a colonization on a higher principle than the desire for gain. Rev. Samuel Skelton was its pastor. Rev. Francis Makemie, the father of the Presbyterian Church in the Middle Colonies, in 1699, founded a Presbyterian church at Snow Hill, Md. The first Presbytery of which there remains a record was constituted in 1706 at Freehold, N. J. Tradition says Makemie was its moderator. In 1716 a synod was formed of the four presbyteries that had grown out of the first one. Its title was: "The Synod of Philadelphia." Dissensions ensued, and a division for 17 years; but in 1768 the American Presbyterian churches were reunited in one ecclesiastical body; and in 1788 a general assembly was instituted, the whole number of congregations being then 419, and of ministers 188.

The increase of the church was rapid, and in 1834 it contained 22 synods, 111 presbyteries, and about 1,900 ministers. In 1801 a plan of union was adopted between Presbyterians and Congregationalists, under which hundreds of congregations were formed in the State of New York and elsewhere. The Cumberland Presbyterians separated from the main body in 1814; and in 1838 the American Presbyterian Church was divided into two great sections, commonly known as Old School and New School Presbyterians. The portion of the Old School branch residing in the slave labor States withdrew in 1861 from their brethren in the other States and formed "The Presbyterian Church of the Confederate States of America." Now it is known as "The Southern Presbyterian Church."

The Old and New School branches reunited in the assembly of 1870, and on the basis of the Westminster Confession of Faith and the catechisms to which standards of doctrine both schools had adhered during the 32 years of separation. Strictly speaking, questions of doctrine had little to do with the division. At the time of this reunion the Old School Presbyterians counted 2,381 ministers, 2,749 churches, and 258,903 communicants; while the New School numbered 1,614 ministers, 1,479 churches, and 143,645 communicants. The United church had five theological seminaries. A revision of the Confession was commenced in 1891 and is now in progress. It is also proposed to formulate a creed which shall express the doctrine of all the branches of the church. There are several branches which virtually hold the polity of the Presbyterian Church in the United States, each having its own theological seminaries and colleges, such as the Presbyterian Churches Northern and Southern, the Cumberland, the Reformed, the United Presbyterian, the Reformed Dutch and German, etc. The total of all 12 bodies of Presbyterians in the United States for 1919 was: Ministres, 11,029: churches, 13,016; members, 1,970,622. By the middle of the 18th century Prebyterian ministers were laboring in Nova Scotia and Qubec, the various divisions of the home churches being represented at an early stage; but most of the early ministers came from the Secession Church. A union between the sections representing the Free and United Presbyterian Churches took place in 1861.

PRESBYTERY, in the Presbyterian Church, a court of judicature above the session and beneath the synod. The presbytery supervises all the congregations within its bounds, hears appeals from the decisions of sessions, examines candidates for the ministry, licenses probationers, and ordains ministers by laying on of hands. Appeal lies from it to the synod.

PRESCOTT, WILLIAM HICKLING, an American historian; born in Boston, Mass., May 4, 1796. He entered Harvard College in 1811, and graduated in 1814. While at college he had the misfortune to lose, by an accident, the sight of one of his eyes, while the other became weakened. Enabled by the possession of an independent fortune to follow his inclinations, he spent two years in wandering in England, France, and

Italy, returned to his native country, married, and settled down to a life of literary labor. Having made himself master of the literature of France, Italy, and Spain, he contributed critical papers to the "North American Review." In 1827, he selected the reign of Ferdinand and Isabella as the subject of a more extensive work. He devoted ten years to collecting material, and in 1838 published his great history which was received with enthusiasm in America, England, and Europe. In 1843 he published "The Conquest of Mexico" and four years later "The Conquest of Peru" which found equal praise here and abroad. Prescott was chosen corresponding member of the French Institute; and in 1850 he paid a short visit to Europe, where

WILLIAM H. PRESCOTT

he was received with the highest distinction. On his return to America he began the composition of what he intended to be the greatest achievement of his latter years, "The History of Philip II." Of this work two volumes appeared in 1855, and a third in 1859, when he was suddenly attacked by paralysis. Prescott was an elegant scholar and writer, a man of cheerful humor and affectionate character, methodical in his habits, and persevering in his pursuits. He walked five miles regularly every day, composing as he walked. He gave one-tenth of his ample income in charity. He died in Boston, Jan. 28, 1859.

PRESCRIPTION, in English law, a claim or title to a thing by virtue of immemorial use, enjoyment, the right or title acquired by such use or by possession had during the time, and in the manner fixed by law, as a right of way, of common, or the like. The term is also used for limitation in the recovery of money due by bond, etc. In medicine, a direction of remedies for a disease, and the manner of using them; a recipe; a written statement of the remedies or medicines to be taken by a patient.

PRESENTMENT, in law, a formal report presented to a court by a grand jury. In commerce, the presenting a bill of exchange to the drawee for acceptance or to the acceptor for payment.

PRESIDENT OF THE UNITED STATES, the chief executive of the government. He is Commander-in-Chief of the army and navy of the country, and has the nomination of most of the executive officers of the government, besides a large number of judicial and administrative functionaries. He is elected for a term of four years, and is eligible for any number of re-elections, though, in conformity with the precedent set by George Washington, no President has yet been elected more than twice. The President's salary was originally $25,000 a year. In 1873 it was doubled. In 1907 an additional $25,000 was allowed for traveling expenses and in 1909 the salary was fixed at $75,000. The President has a veto power and unlimited pardoning prerogative as to offenders against National laws. He is elected by an electoral college, which in some contingencies makes the choice by States. In case of his death or total disability the functions of the office devolve on the Vice-President, who is the presiding officer of the Senate. The following is the list of Presidents up to the present: George Washington, 1789 and 1793; John Adams, 1797; Thomas Jefferson, 1801 and 1805; James Madison, 1809 and 1813; James Monroe, 1817 and 1821; John Quincy Adams, 1825; Andrew Jackson, 1829 and 1833; Martin Van Buren, 1837; William Henry Harrison (died April 4, 1841), 1841; John Tyler (elected as Vice-President), 1841; James Knox Polk, 1845; Zachary Taylor (died July 9, 1850), 1849; Millard Fillmore (elected as Vice-President), 1850; Franklin Pierce, 1853; James Buchanan, 1857; Abraham Lincoln (assassinated April 14, 1865), 1861 and 1865; Andrew Johnson (elected as Vice-President), 1865; Ulysses S. Grant, 1869 and 1873; Rutherford B. Hayes, 1877; James A. Garfield (died by assassination Sept. 19, 1881), 1881; Chester A. Arthur (elected as Vice-President), 1881; Grover Cleveland, 1885; Benjamin Harrison, 1889; Grover Cleveland, 1893; William McKinley, 1897 and 1901 (assassinated

Sept. 6, 1901); Theodore Roosevelt (1901). Elected 1905. William H. Taft, 1909; Woodrow Wilson, 1913 and 1917; Warren G. Harding, 1921.

PRESIDIO (SPANISH, GARRISON, GUARD). In the United States there are two military posts or reservations called by this name—that of San Francisco and that of Monterey. The Presidio of San Francisco is near the suburbs of that city situated on the harbor. It was a military post under both the Mexican and Spanish Governments and by executive order was reserved as a military base by the United States. Its area is nearly 1,500 acres. The Presidio of Monterey, Cal., is much smaller and likewise was taken over as a military station by the United States, after it had been similarly used by Spain and Mexico.

PRESSBURG (POZSONY), a town in Hungary; 35 miles E. of Vienna, on the left bank of the Danube, and on spurs of the Little Carpathians. The most striking edifice is the ruined royal palace, on the top of an eminence, burned in 1811. The cathedral is a large Gothic structure, dating from the 11th century. The trade chiefly in corn and timber, is extensive. Pressburg is a place of very great antiquity. In 1541, when the Turks captured Buda, it became the capital of Hungary, and retained the honor till the Emperor Joseph II. restored it to Buda. The treaty by which Austria ceded Venice to France and the Tyrol to Bavaria was signed here in 1805. Pop. about 80,000.

PRESTER JOHN, PRESBYTER, or **PRIEST JOHN,** a name given in the Middle Ages to a supposed Christian sovereign, said to hold his empire in some central part of Asia (Tibet), though, according to the Portuguese, he was King of Abyssinia.

PRESTO (Italian), quick, used in music to designate a faster rate of movement than is indicated by *allegro*. *Presto assai* denotes very quick, and *prestissimo* the highest degree of quickness.

PRESTON, a municipal and parliamentary borough of England, in Lancashire, 27 miles N. E. of Liverpool. The environs of the town exhibit much pleasing scenery, and there are some fine public parks. Among the churches, Christ Church is admired for the purity of its Norman architecture. The Catholic church, St. Walburge's, is considered the finest in the town. The original staple manufacture of the town, linen, has been completely eclipsed by the cotton manufacture, of which Preston is now one of the chief centers. Preston also has machine shops, iron and brass foundries, railway carriage works, breweries, malt houses, roperies, tanneries, etc. In 1323 Preston, originally Priest's Town, was taken and burned by Robert Bruce; in the great civil war it espoused the Royalist cause, and was twice captured by the Parliamentarians; in the rebellion of 1715 it was occupied by the Jacobite forces; in that of 1745 the Highlanders, headed by the Pretender, passed through Preston both on their march to London and on their retreat. Preston was the birthplace of Arkwright. It returns two members to Parliament. Pop. (1917) 106,747.

PRESUMPTION, in law, in the absence of direct evidence that which comes nearest to the proof of a fact. Presumptions are of three degrees: Violent, in which those circumstances appear which necessarily attend the fact; probable, arising from such circumstances as usually attend the fact; and light (without validity).

PRETENDER, one who made claim to a throne under a pretense of right (as Perkin Warbeck, Lambert Simnel, in English history); specially applied to the son and grandson of James II., the heirs of the House of Stuart, who laid claim to the throne of England.

PRETORIA, the capital of the former South African Republic (Transvaal), since 1910 the seat of government of the Union of South Africa. Pretoria was founded in 1855 by the Boer leader Pretorius. It owes its prosperity chiefly to the gold mines of Johannesburg, 30 miles distant. Pop. about 65,000.

PREVEZA, or **PREVISA,** a fortified town formerly in the extreme S. W. of European Turkey, now belonging to Greece; on the N. side of the entrance to the Gulf of Arta. It exports valonia acorns, wool, cotton, and oil. The Venetians held the town from 1683 to 1797. One year later Ali Pasha drove out the French garrison and plundered the place. Pop. about 7,500.

PRÉVOST, EUGÈNE MARCEL, a French novelist; born in Paris, May 1, 1862. His first story, "The Scorpion" (1887), the tragic history of a clerical tutor in a Jesuit school, made a deep impression because of the fine psychological insight and intimate knowledge of the priestly life it displayed. Among his works are "Our Helpmate: Provincials and Parisiennes" (1885); "Chonchette" (1888); "Mlle. Jaufre" (1889); "Women's Letters" (1892); "A Woman's

Autumn" (1893); "The Mill at Nazareth" (1894); "The Demi-Virgins" (1894); "Les Verges Fortes" (1901); "Monsieur et Madame Moloch" (1906); "Lettres à Françoise Mariée" (1910); etc.

PRIAM, a King of Phrygia, and the last sovereign of Troy. Soon after his accession, the discovery of a gold mine in his kingdom enabled him to enlarge and beautify his capital, and raise a powerful army. By his first wife he had only one child; but by Hecuba, his second queen, he had a numerous family. The perfidy of his son Paris in eloping with Helen led to the long and fatal war, which, after enduring for 10 years, terminated in the entire overthrow of the state, death of most of his sons, and his own murder by Pyrrhus, about 1184 B. C.

PRIBILOF ISLANDS, a group of islands on the coast of Alaska, in Bering Sea. The largest are St. Paul, St. George, Walrus, and Beaver Islands. They are frequented by numbers of fur seals. The natives are Aleutians.

PRIBRAM, a mining town of Bohemia, 48 miles S. S. W. of Prague, with important lead and silver mines, and various manufactures. There is a mining academy, and a church much frequented by pilgrims. Pop. about 14,000.

PRICE, RICHARD, an English philosopher; born in Tynton, Glamorganshire, Feb. 22, 1723. He was a Dissenting minister, friend of Benjamin Franklin, and sympathized warmly with the American colonists. His tables of vital statistics and calculations of expectancy of life were the basis of modern annuities and life insurance. His principal writings are: "An Appeal to the Public on the Subject of the National Debt" (1771); "Civil Liberty and the Justice and Policy of the War with America" (1776); "The American Revolution and the Means of Rendering It a Benefit to the World" (1784). He died April 19, 1791.

PRICE, STERLING, an American military officer; born in Prince Edward co., Va., Sept. 11, 1809. Settled in Missouri in 1831; was elected to Congress in 1844; served in the Mexican War as colonel and Brigadier-General of volunteers; was military governor of Chihuahua in 1847; governor of Missouri in 1853–1857, and president of the State Convention in February, 1861. When the Civil War broke out he joined the Confederate army, and became Major-General in May, 1861. Was commander of the Department of the W. in 1862, and afterward of the districts of Tennessee and Trans-Mississippi. He died in St. Louis, Mo., Sept. 29, 1867.

PRICKLY ASH, a name given to several prickly shrubs of the United States.

PRICKLY HEAT, a skin disease, characterized by minute papulæ formed by the hyperæmia of the sweat follicles.

PRICKLY PEAR, *Opuntia vulgaris*, natural order *Castaceæ*, otherwise called Indian fig. The fruit is purplish in color, covered with fine prickles, and edible. It is a native of the tropical parts of America, whence it has been introduced into Europe, Mauritius, Arabia, Syria, and China.

PRIDE, THOMAS, an English military officer; one of the most resolute of Cromwell's soldiers; born in London of humble origin. He commanded a brigade under Cromwell in Scotland, and, when the House of Commons betrayed a disposition to effect a settlement with the king, was appointed by the army to purge it of its Presbyterian royalist members. The House, reduced to about 80 members, brought the king to justice. Colonel Pride sat among his judges, and signed the death-warrant. He died Oct. 23, 1658.

PRIE-DIEU, a kneeling desk for prayers.

PRIENE, anciently one of the 12 cities of Ionia; stood a little N. W. of the mouth of the Mæander in Caria.

PRIEST, one who in any religion performs the sacred rites and, more or less, intervenes between the worshiper and his God, especially by offering sacrifice.

In the Anglican Church, a clergyman in priest's orders, as distinguished from a deacon. Only a priest can administer the Holy Communion and read the Absolution. In the Roman Church, a cleric who has received the third grade in holy orders, and who is thereby empowered to "offer, bless, rule, preach, and baptize."

PRIESTLEY, JOSEPH, an English natural philosopher; born in Fieldhead, England, March 13, 1733. He was pastor of an Independent church and while tutor in a seminary he published the "History and Present State of Electricity," which procured his election into the Royal Society. It was here also that his political opinions were first manifested, in an "Essay on Government." He went to Leeds, where he made those important discoveries with regard to the properties of fixed air, for which he received the Copley medal of the Royal Society in 1772. In 1776 he communicated to the same learned body his ob-

servations on respiration, in which he first experimentally ascertained that the air parts with its oxygen to the blood as it passes through the lungs. He next removed to Birmingham, where he became once more minister of an Independent congregation, and occupied himself in his "History of the Corruptions of Christianity." His sympathy for the French Revolution led to the destruction of his house and library in 1791. After this he removed to Hackney, where he succeeded Dr. Price; but, in 1794, compelled by incessant persecutions to fly his intolerant country, came to the United States and took up his abode at Northumberland, Pa. His works extend to between 70 and 80 volumes. Besides those before mentioned are: "Experiments and Observations on Air"; "Lectures on General History," on the "Theory and History of Language," and on the "Principles of Oratory and Criticism"; "Hartleian Theory of the Human Mind"; "Letters to a Philosophical Unbeliever"; "History of Early Opinions Concerning Jesus Christ," etc. He died in Northumberland, Pa., Feb. 6, 1804.

PRIM, JUAN, a Spanish general; born in Reus, Dec. 6, 1814; rose rapidly to be a colonel, general, marshal, and marquis. Failing in an insurrectionary attempt in 1866, he fled to England and Brussels, but here he guided the movement that in 1868 overthrew Isabella. He was war minister under Serrano. He secured the election of an Italian prince, Amadeo, as king, and shot by an assassin, died Dec. 30, 1870.

PRIMA DONNA, the first female singer in an opera.

PRIMARY ROCKS, a term formerly including all the crystalline and non-fossiliferous rocks which were deposited, it was believed, anterior to the appearance of life upon the earth.

PRIMATE, the chief ecclesiastic in certain churches. The Archbishop of York is called the Primate of England, the Archbishop of Canterbury the Primate of All England, and the Roman Catholic Archbishop of Baltimore the Primate of the United States.

PRIMATES, the first and chief of Linnæus' orders of the class Mammalia. He included under it four genera: *Homo* (one species, five varieties), *Simia* (21 species), *Lemur* (three species), and *Vespertilio* (seven species). Cuvier ignored the order, classing Man as *Bimana* (Owen's *Archencephala*), and Apes and Lemurs as *Quadrumana;* the bats now constitute an order by themselves, and the lemurs rank as a sub-order. With the advance of zoölogical and anatomical knowledge the use of the name has revived "for the apes, not only by naturalists, who, like Huxley, retain man within its limits; but also by others (Geoffroy St. Hilaire and Gervais), who consider he should be excluded from it."

PRIME, in the Roman Catholic Church one of the canonical hours, and also the service in the breviary which falls to be performed at that time.

PRIME MERIDIAN, that meridian from which longitude is measured. In Great Britain and its dependencies it is the meridian of Greenwich; in the United States, the meridian of Washington.

PRIME MINISTER, an officer of state, who at the summons of the sovereign has succeeded in forming an administration, of which he is the head, and which may be named after him. In England it is on his advice that as vacancies occur the archbishops, bishops and deans and the highest judges are appointed, and over one hundred crown livings are filled; and on his recommendation that the most envied temporal titles and honorable distinctions—peerages, baronetcies, and the Garter, for example—are conferred, and such high appointments as the lord-lieutenancy of Ireland, the viceroyalty of India, the principal ambassadorships and colonial governorships, and lord-lieutenancies of countries, are made by the crown. He is the leader of the House of Parliament of which he is a member. In European governments the prime minister, or premier, is usually charged with the management of diplomatic affairs, and in this respect resembles the Secretary of State of the United States.

PRIME NUMBER. A number or quality is prime when it cannot be exactly divided by any other number or quantity except 1. Two numbers or quantities are prime with respect to each other, when they do not admit of any common divisor except 1.

PRIMITIVE METHODISTS, a section of the Wesleyan community which arose in Staffordshire, England, under the leadership of Hugh Bourne (1792–1852). Having held camp meetings like those in the United States, he was censured for it by the English Wesleyan Conference in 1807, and, seceding, formed a new connection, the first class meeting of which was held at Standley, in Staffordshire, in 1810. In doctrine the Primitive Methodists agree with the Wesleyans.

PRIMOGENITURE, the state of being the eldest of children of the same par-

ents; seniority by birth among children. Also, the right, system, or rule under which, in England, in cases of intestacy, the eldest son of a family succeeds to the real estate of his father to the absolute exclusion of the younger sons and daughters.

PRIMROSE, the *Primula vulgaris*. Common in copses, pastures, hedgebanks, and woods or by the side of streams. Its root-stock is emetic. The peerless primrose is *Narcissus biflorus*.

PRIMROSE LEAGUE, a league having for its objects "the maintenance of religion, of the estates of the realm, and of the imperial ascendancy of the British empire."

PRIMULACEÆ, primworts; herbs, generally with radical exstipulate leaves. Flowers on radical scapes or umbels, or in the axil of the leaves. Genera 18, species about 200.

PRINCE. (1) One who holds the first, or chief place, or rank; a sovereign; the ruler of a country or state. (2) The ruler or sovereign of a state or territory which he holds of a superior. (3) The son of a sovereign, or the issue of the royal family. In heraldic language, the title of prince belongs to dukes, marquises, and earls of Great Britain, but in ordinary use it is confined to members of the royal family. The only case in which it is a territorial title is that of the Prince of Wales. On the Continent of Europe the title of prince is borne by members of families of very high rank, though not immediately connected with any royal house.

PRINCE, JOHN DYNELEY, an American university professor and philologist. Born in New York in 1868 he graduated at Columbia at the early age of twenty, studied in Berlin and received his Ph.D. from Johns Hopkins in 1892. From 1892 to 1902 he was professor of Semitic languages and dean of the Graduate School of New York University. From 1902 to 1915 he occupied a similar professorship at Columbia until in 1915 the chair of Slavonic languages was created when he was appointed to that. Professor Prince in 1909 was the Republican speaker of the New Jersey Assembly and President of the New Jersey Senate in 1912, and for a short time was acting Governor of the State.

PRINCE EDWARD ISLAND, an island forming a Province of the Dominion of Canada, in the Gulf of St. Lawrence; area, about 2,134 square miles. Pop. about 100,000. The island is naturally divided into three peninsulas, and the whole is eminently agricultural and pastoral, the forests now being of comparatively limited extent. The climate is mild; winter, though longer and colder than in England, is free from damp, and summer is fitted to promote the growth of all the ordinary cereals. Sheep, cattle, and horses are reared in numbers; cod, mackerel, herring, oysters, and lobsters form the most productive part of the fisheries. The manufactures are chiefly confined to linen and flannels for domestic use; there are also several tanneries, and shipbuilding is carried on to a considerable extent. The exports consist of timber, agricultural produce, and live stock. The capital is Charlottetown. Pop. about 12,000. The island is supposed to have been discovered by Cabot. It was first colonized by France, captured by Great Britain in 1745, restored and recaptured, and finally in 1873 was admitted to the Dominion of Canada.

PRINCEITE, the sect into which the movement of the Lampeter Brethren developed. It was founded about 1840 by the Rev. Henry James Prince, a clergyman of the extreme Evangelical school, who asserted that the Holy Ghost was incarnate in him, and that the Gospel dispensation was thereby superseded. Prince established his community near Bridgeport, England. This sect is also called Agapemone.

PRINCE OF WALES. See WALES, PRINCE OF.

PRINCE OF WALES ISLAND. See PENANG.

PRINCES ISLANDS, a beautiful group of nine islets near the E. end of the Sea of Marmora, about 10 miles S. E. of Constantinople, the largest being called Prinkipo. Pop. (1917) 10,500.

PRINCETON, a town in Mercer co., N. J., on the Delaware and Raritan canal, near the Millstone river, and on a branch of the Pennsylvania railroad; 10 miles N. E. of Trenton. It contains waterworks, gas and electric lights, National, State, and savings banks, and weekly newspapers. Princeton is chiefly known as the seat of the College of New Jersey, officially called PRINCETON UNIVERSITY (*q. v.*). The battle of Princeton took place at the bridge on Stony Brook, about 3 miles W. of the town. During the engagement, which was very severe, General Mercer fell mortally wounded. The action resulted in a decisive victory for the Continental army. The British lost nearly 200 in killed and wounded, and 230 captured. The American loss was about 37. After his retirement ex-President Cleveland made his

home in Princeton. Pop. (1910) 5,136; (1920) 5,917.

PRINCETON THEOLOGICAL SEMINARY, an educational institution in Princeton, N. J.; founded in 1812, under the auspices of the Presbyterian Church; reported at the close of 1919: Professors and instructors, 13; students, 95; president, J. R. Stevenson, D. D., LL. D.

PRINCETON UNIVERSITY, an educational institution in Princeton, N. J. It was founded Oct. 22, 1746, by a charter given under the seal of the Province of New Jersey, "for the instruction of youth in the learned languages and in the liberal arts and sciences." On Sept. 14, 1748, a more ample charter was granted by King George II., establishing the corporation under the name of the College of New Jersey; and providing that the management of its affairs should be in the hands of 23 trustees (later changed to 27). Among these were the governor of New Jersey, Aaron Burr, Samuel Blair, and David Green, names that have ever since been identified with the history of the college. After the War of the Revolution the royal charter was confirmed and renewed by the Legislature of New Jersey. In May, 1747, the College of New Jersey was officially opened at Elizabethtown (now Elizabeth), and the same year was moved to Newark. Soon after it was again moved to Princeton, where in 1754 the first college building, Nassau Hall (so named in memory of King William III. of the house of Nassau), was erected.

The college suffered severely during the Revolutionary War, the main building being used as a barrack by both American and British troops (see PRINCETON). Its president, Dr. Witherspoon, and two of its alumni, Richard Stockton and Benjamin Rush, were signers of the Declaration of Independence. In 1783 the Continental Congress and General Washington were present at the commencement exercises, Washington presenting 50 guineas to the college. This sum was appropriated by the trustees to the painting of a picture of Washington by the elder Peale. It now hangs in Nassau Hall, and is considered one of the best extant pictures of him. In 1802, and again in 1855, the hall was partly destroyed by fire. After the Civil War the college began to make rapid progress. The number of students increased, the faculty was enlarged, and in 1872 the Chancellor Green Library (named in honor of its donor) was erected. Up to this time the course of instruction had led exclusively to the degree of Bachelor of Arts; but in 1873 the John C. Green School of Science was added, and in 1875 the Department of Civil Engineering was also created. In 1889 the Department of Electrical Engineering was founded, and in 1901 the Graduate School was formally established, Prof. Andrew West being appointed its dean.

On Oct. 22, 1896, the 150th anniversary of the signing of the first charter, the title of Princeton University was assumed. In 1897 the Chancellor Green Library was connected with a new library building, having a capacity to shelve 1,200,000 volumes. The total number of buildings now belonging to the university is over 40, among them being the Halsted Observatory, with an instrument of 23 inches aperture and 30 feet focal length; Alexander Hall, with a seating capacity of 1,500; Marquand Chapel; Dickinson Hall, a building containing some 25 lecture and recitation rooms; the School of Science building, containing lecture rooms, physical laboratories, and the Museum of Biology; the Biological Laboratory; the Graduate College and Cleveland Memorial Tower, Hamilton Hall, Holder Hall, Cuyler Hall; the Chemical Laboratory; the Art Museum; and a number of dormitories, among the more recent being Blair Hall, and Stafford Little Hall, donated respectively by John I. Blair and H. S. Little.

Secret societies are prohibited at Princeton, but there are two strong literary societies, the Cliosophic and American Whig, founded before the Revolution, and having valuable independent libraries. There are also two undergraduate religious societies, the Philadelphian (founded in 1825) and St. Paul's (founded in 1875).

In 1919 there were 180 instructors, 1,500 students, and 430,000 bound volumes in the library. There are over 100 endowed scholarships, and in addition pecuniary aid is given in certain cases. The following is a list of the presidents from the beginning:

Rev. Jonathan Dickinson, 1747.
Rev. Aaron Burr, 1748–1757.
Rev. Jonathan Edwards, 1757–1758.
Rev. Samuel Davies, 1759–1761.
Samuel Finley, D. D., 1761–1766.
John Witherspoon, D. D., LL. D., 1768–1794.
Samuel Stanhope Smith, D. D., LL. D., 1795–1812.
Ashbel Green, D. D., LL. D., 1812–1822.
James Carnahan, D. D., LL. D., 1823–1854.
John Maclean, D. D., LL. D., 1854–1868.

James McCosh, D. D., LL. D., Litt. D., 1868–1883.
Francis Landley Patton, D. D., LL. D., 1883–1902.
Woodrow Wilson, LL. D., Litt. D., 1902–1910.
John Grier Hibben, LL. D., 1912–.

PRINCIP, GAVRILO, the assassin of Archduke Francis Ferdinand and his wife. He was a native of Bosnia and one of the extreme Serbian patriots. When the Archduke visited Sarajevo on June 28, 1914, an attempt was made to assassinate him with bombs. Narrowly escaping death, the Archduke and his wife were being driven in a carriage to the royal palace when Princip fired into the equipage just as it turned the corner of a narrow street. The Archduke and Duchess were killed almost instantly. Princip was arrested and died two years later while awaiting trial.

PRINCIPAL, the term used in the United States to designate the proprietor, chief, or head of an academy or seminary.

PRINCIPAL AND AGENT, a designation in law, applied to that branch of questions which relate to the acting of one person for another in any commercial transaction.

PRINGLE, THOMAS, an English poet; born in Blaiklaw, Roxburghshire, Jan. 5, 1789. Lame from childhood, dyspeptic, devout, he went at 17 to Edinburgh University. He took to writing at an early age, and besides other literary schemes, started the "Edinburgh Monthly Magazine." In 1820 he set sail with a party of emigrants of his father's family for Cape Colony. He traveled into the interior with the party, and had his heart stirred within him to see the inhumanity practiced toward the natives by English and Dutch residents alike. He started the "South African Journal," and fought a brave fight for the freedom of the press. But he was bullied by the tyrannical governor, Lord Charles Somerset, his schemes crushed, and himself reduced to poverty. He returned to London in 1826, and became secretary of the Anti-Slavery Society. His "Ephemerides" (1828) was a collection of graceful verse. He died in London, Dec. 5, 1834.

PRINTING, the art of producing impressions from characters or figures on paper or any other substance. Printing from movable types was, according to Professor Douglas, probably practiced in China as early as the 12th or 13th century, as there are Korean books printed from movable clay or wooden types in 1317. The great discovery was that of forming every letter or character of the alphabet separately. The credit of inventing this simple yet marvelous art is contested by the Dutch and Germans. Printing was brought to England in 1476 or 1477 by William Caxton. The first printing press set up in America was introduced by the Viceroy of Mexico, Antonio de Mendoza, and the first book printed by it in the New World was "The Ladder de S. Juan Climaco" (1536). The earliest press in the British-American colonies was brought over for Harvard College in 1638. "Bay Psalm Book" (1640) was its first important work; but in 1639 it printed the "Freeman's Oath" and an almanac. In Philadelphia a press was set up in 1685, in New York in 1693.

The earliest improvement on the printing press was made by the celebrated Earl Stanhope, who constructed a press of iron of sufficient size to print a whole surface of a sheet. A multitude of improvements speedily succeeded this press. Among those which gained a large share of approbation was the Columbian press, which was of American invention. This press was taken to Great Britain in 1818 by George Clymer of Philadelphia, and patented. The pressing-power in this instance was procured by a long bar or handle acting upon a combination of exceedingly powerful levers. Printing is now executed by one or other of the varieties of cylinder presses, moved generally by electricity, or steam. Printing machines may be divided into two distinct classes—those for printing books, in which accurate register is required, and those for printing newspapers, in which register is not sought for, and speed is of first consequence.

The printing business is divided into three departments—those concerned respectively with jobbing or commercial work, with book work, and with news work. Jobbing work is chiefly done on small platen machines invented by G. P. Gordon, about 1868. Larger work is done on machines having one or more cylinders. It has been found, since machines have been brought to their present degree of perfection, that they give far superior results to those from presses —their impression is stronger, more solid, and more uniform, and the sheets can be laid on them with a precision unattainable with handpresses. Paper is not now made spongy and stretchable by being wetted, and the result of working it dry is that the type is brought up with greater brightness, and the delicate lines of engravings are printed finer, clearer, and cleaner. The colored sup-

plements of the pictorial journals are often admirable reproductions of works of high art. A single color press built in 1898 contained between 50,000 and 60,000 individual parts.

Books are generally printed in sheets of 16 pages, or multiples of 16 (32, 64, 128); in the latter case they are cut into sheets of 16 after being printed. Several very ingenious machines have been invented for setting type which have been successful. They are worked something after the manner of typewriting machines. Several of the latest of these cast and set the type by one movement. This saves the labor of redistributing the types, as when done with they are melted again.

The latest achievement in printing machines is the combination color octuple rotary perfecting press. Four-roller distribution on the color portion insures fine work, and special oil-fountain arrangements take care of the offset. The printing is done from both stereotype and electrotype plates. The combination half-tone and color pictorial electrotype perfecting press is designed especially for printing, from electrotype plates, high-grade periodical work, with half-tone and color illustrations.

PRIOR, a title loosely applied before the 13th century to any monk ranking above his fellows. Priors are now of two kinds: conventual and claustral. A conventional prior is the head of a religious house, either independently, as among the Regular Canons, the Carthusians, and the Dominicans, or as superior of a cell or offshoot from some larger monastery. A claustral prior is appointed in houses in which the head is an abbot, to act as superior in the abbot's absence.

PRIOR, MATTHEW, an English poet; born in Wimborne-Minster, England, July 21, 1644; educated at Westminster School and Cambridge. At college he contracted an intimacy with Charles Montagu, afterward Earl of Halifax, with whom, in 1687, he composed the "Country Mouse and City Mouse"—a parody on Dryden's "Hind and Panther." This work brought him fame, and in 1690 he was appointed secretary to the English embassy at The Hague. In 1697 he was nominated secretary to the plenipotentiaries who concluded the Peace of Ryswick, and on his return was made secretary to the lord-lieutenant of Ireland. In 1701 he entered Parliament as a Whig, but soon after changed his politics and joined the Tory party. In 1711 he was employed in secretly negotiating at Paris the terms of the treaty of Utrecht, and he remained in France till 1714, at first as secret agent, afterward as ambassador. On the accession of George I., he was kept in custody on a charge of high treason for two years. During his imprisonment he wrote "Alma, or the Progress of the Mind,"

MATTHEW PRIOR

which with his most ambitious work, "Solomon," was published in 1718. He died in Wimpole, Sept. 18, 1721.

PRIPET MARSHES, an extensive swamp surrounding the city of Pinsk, in western Russia, and extending up and down both banks of the Pripet river. Officially this region is known as the Rokitno Marsh. In area these bogs are about half the size of the entire territory of Rumania. Only a comparatively small portion of the marsh had been explored before the outbreak of the World War, when it became the theater of important military operations between the Russian and German forces, especially after the capture of Brest-Litovsk by the Germans, on Aug. 27, 1915. After their disastrous defeat at this time the Russian line retired and took its stand along the eastern side of the Pripet marshes. Along this front there was, of necessity, a large territory intervening between the Russian and German lines, invaded only by raiding parties and occasional patrols, moving in punts in summer, and on the ice in winter. It was only during the winter months that fighting of any magnitude could take place here, and then the contending forces would advance over the ice and engage

in pitched battles. The region was, however, impassable to heavy artillery, so that neither side was able to break the deadlock created by the nature of the country. Across this swamp region the two belligerents continued facing each other until the end of the war on the Eastern Front.

PRISM, in geometry, a solid having similar and parallel bases, its sides forming similar parallelograms. The bases may be of any form, and this form (triangular, pentagonal, etc.) gives its name to the prism. In optics, any transparent medium comprised between plane faces, usually inclined to each other. It is used to refract and disperse light, resolving it into the prismatic colors.

PRISON ASSOCIATION, AMERICAN, an organization of officials of American prisons, founded by Dr. E. C. Wines, of New York, in 1870, at a conference in Cincinnati, O., and incorporated under the laws of New York in the following year. The object of the association was the general improvement of conditions, not only for the officials and employees of such institutions, but for prisoners as well. Until 1877 the organization developed a vigorous growth, issuing reports in 1872, 1874, and 1877 of considerable value to students of penology. The death of Dr. Wines, however, at this time, caused a notable decrease in the activities of the association, which lasted until 1883, when it again showed signs of revival. The organization is now an influential factor in all movements toward prison reform, and has standing committees on criminal law, reform, prevention, probation, parole, prison discipline, discharged prisoners and prison statistics. With it are affiliated five other national organizations, comprising wardens, prison physicians, prison chaplains, women officials and employees, and criminologists.

PRISON REFORM, the growing tendency to regard the imprisonment of criminals as a preventative measure, rather than as punishment inflicted by society as revenge. In England prisons were largely based on this latter theory, until the social consciousness was first awakened by the writings of the popular novelist, Charles Reade, and most notably by his novel, "It is Never Too Late to Mend." In the early days of last century prison conditions were exceptionally bad in the United States. As an instance, for years after the Revolution convicts in the State of Connecticut were confined underground in an old, abandoned copper mine, at Simsbury, Conn. One of the first moves toward better conditions was represented in the building of the Eastern Penitentiary, in Philadelphia, in 1817, and the Auburn State Prison, in Auburn, N. Y., in 1816, both of which institutions were conducted on a comparatively humane basis. The movement was still further stimulated by the discussions at the International Prison Congress, held in Frankfurt, Germany, where the United States was strongly represented, among the delegates being Dr. E. C. Wines, the founder of the American Prison Association, which had a very strong influence in this country, after its formation. One of the strongest exponents of prison reform at the present time is Thomas Mott Osborne, in charge of the naval prison at Portsmouth, who first excited a more general interest in prison reform by himself entering Sing Sing Prison, in the guise of a convicted criminal, and obtaining a first hand knowledge of prison conditions, from the point of view of the inmates. It was he who, as governor of the prison, first instituted the parole system, whereby prisoners of good conduct were allowed entire liberty on leaves of absence, being placed on their honor to return. "Self-government" in prisons is another feature of Mr. Osborne's general system, which is now practiced at Portsmouth, under his personal direction, and at Sing Sing, the State Prison for women, at Auburn and at the Preston Industrial School, in California, with such a high degree of success that other prisons throughout the country are adopting the practice. A noteworthy example of legislative efforts toward prison reform was the effort of the Prison Reform League, of Pennsylvania, which in 1917 caused the appointment of a special commission to study prison conditions, with the object of recommending legislation with the object of prison reform in view. The report of this commission was rendered in 1919, but the recommendations made were so far-reaching that they have not, as yet, been embodied in any legislation.

PRISREND, a city of eastern Serbia, close to the frontier with Albania, 75 miles E. of Scutari, and fourth city in size in the whole of Serbia, with a population, in 1911, of 21,244. The city has a citadel 1,100 feet above sea level, and 24 mosques. It was part of the territory taken from the Turks during the Balkan Wars, in 1912. Through this city fled the broken remnants of the Serbian Army, after the invasion of the country by the forces of the Central Powers, in the fall of 1915, this being the last avenue of escape left open after their final

defeat on Kossovo Plain, about 30 miles further N.

PRISTINA, a town of Serbia, 30 miles N. E. of Prisrend, administrative seat of a department of the same name in the S. E. part of Serbia, in the foothills of the mountains of Albania. After the invasion of Serbia by the Austro-German forces, in the latter part of November, 1915, the remnants of the defeated Serbian forces made their last stand here, on the edge of the great Kossovo Plain, where 300 years before the last of the Serbian Czars had been crushed. The battle lasted four days, the aged King Peter being in the field with his men during the whole period. Finally the Serbian battle formation was smashed, and Pristina was taken by the Teutons, under General Von Mackensen, on Nov. 23, 1915. The population, before the war, was about 10,000.

PRITCHARD, JETER CONNELLY, associate justice of the Supreme Court of the District of Columbia; born in 1857, he engaged in the printing business as a young man and in 1873 became the editor of the "Roan Mountain Republican" of Bakersville, N. C. He took a prominent part in political affairs and though a Republican, was elected several times to the State Legislature of North Carolina. In 1895 he was elected to the United States Senate and re-elected in 1897. As he was the only Southern Republican in the Senate his influence was considerable. He undertook to build a white Republican party in the South, called the "Lily-White" party. Appointed associate justice in the District of Columbia in 1903. In 1912 he was appointed by President Taft to head the new Circuit Court of Appeals of the District of Columbia.

PRITCHETT, HENRY SMITH, an American educator and head of the Carnegie Foundation for the Advancement of Teaching since 1906; born in Missouri in 1857, he took up, after his graduation from college, the study of astronomy, becoming in 1878 assistant astronomer in the United States Naval Observatory in Washington. In 1882, he traveled to New Zealand to observe the transit of Venus. The next year Washington University, St. Louis, Mo., appointed him professor of astronomy, a position he held until 1897. For the three years, 1897 to 1900, he was superintendent of the United States Coast and Geodetic Survey. From 1900 to 1906 he was president of the Massachusetts Institute of Technology in Boston, Mass.

PRIVATEER, a ship owned by a private individual, which under government permission, expressed by a letter of marque, makes war on the shipping of a hostile power. To make war on an enemy without this commission, or on the shipping of a nation not specified in it, is piracy. Privateering was abolished by mutual agreement among European nations, except Spain, by the Declaration of Paris in 1856; but the United States of America refused to sign the treaty, except on condition that all private property at sea, not contraband, should be exempt from capture. This "Marcy," or "American," amendment, as it was called, was not accepted. This doctrine was again affirmed by the United States delegates to the Peace Conference at The Hague in 1898, but was again rejected by the European powers. While not considered PIRACY (*q. v.*) by the law of nations, they were looked on as little better during the great wars at the end of the 18th and the beginning of the 19th century, and as a rule received but scant mercy at the hands of the regular services.

HENRY SMITH PRITCHETT

PRIVET (*Ligustrum*), a genus of plants of the natural order *Oleaceæ*, containing a number of species of shrubs and small trees with opposite leaves, which are simple and entire at the mar-

gin; the flowers small, white. Common privet (*L. vulgare*) is a shrub growing in bushy places and about the borders of woods in the middle and S. of Europe, and in some parts of Great Britain, now also naturalized in some parts of North America. It has half-evergreen, smooth, lanceolate leaves; and berries about the size of peas, black, rarely white, yellow, or green. The flowers have a strong and sweetish smell; the leaves are mildly astringent, and were formerly used in medicine. The berries, which hang on the shrub during winter, have a disagreeable taste, but serve as food for many kinds of birds; they are used for dyeing red, and, with various additions, green, blue, and black. A rose-colored pigment obtained from them is used for coloring maps. The wood is hard, and is used by turners, and by shoemakers for making wooden pegs.

PRIVY COUNCIL, in English law, the principal council of the sovereign, consisting of members chosen at his or her pleasure. Its dissolution depends on the royal pleasure; by common law it was dissolved *ipso facto* by the demise of the sovereign, but to prevent the inconvenience of having no council in being at the accession of a new prince, the privy council is enabled by statute to continue for six months after the demise of the crown, unless sooner dissolved by the successor. It is presided over by the Lord President of the Council, who has precedence next after the Lord Chancellor. Members of the privy council are addressed as Right Honorable. The office of a privy councilor is now confined to advising the sovereign in the discharge of executive, legislative, and judicial duties.

PRIVY SEAL, the seal used in England to be appended to grants which are afterward to pass the great seal, and to documents of minor importance, which do not require to pass the great seal. In Scotland there is a privy seal used to authenticate royal grants of personal or assignable rights.

PRIX DE ROME, a prize given by the French Government to a number of painters, sculptors, architects, engravers and musicians. Founded by Louis XIV. in 1866, its purpose was to educate young painters and sculptors at Rome at the expense of the government. Napoleon enlarged the prize and made it open to musicians and architects, in addition to painters and sculptors. At present the winner of the scholarship is selected from a group of 10 which have passed the rigid examinations in their respective fields. The winner is supported by the French Government for four years while he pursues his further studies at the Académie de France at Rome. The prize is awarded every year to painters, sculptors, musicians, and architects, and every two or three years to artists in other fields. The award is made by giving the 10 selected artists three months to prepare a specimen of their work, which is then judged by the Académie des Beaux-Arts. Specimens of the work of the artists in Rome holding the prize are exhibited in Paris every year to show the progress of the scholars.

PRIZE COURT, a court established to adjudicate on prizes captured at sea.

PROBATE, in law, the official proof of a will. This is done either in common form, which is upon the oath of the executor before the judge of the probate court; or *per testes* (by witnesses), in some solemn form of law, in case the validity of the will is disputed.

PROBATE COURT, a court of record established to exercise jurisdiction and authority in relation to probate of wills and letters of administration, and to hear and determine all questions relating to matters and causes testamentary.

PROBATIONER, one who is in a state of probation or trial, so that he may give proof of his qualifications for a certain position, place, or state. Also a student in divinity.

PROBOSCIDEA, in zoölogy, an order of mammalia, characterized by the absence of canine teeth, the molars few in number, large, and transversely ridged or tuberculate; incisors always present, growing from persistent pulps, and constituting long tusks. One living genus, *Elephas*.

PROBOSCIS MONKEY, or **KAHAU** (*Presbytes nasalis*), a native of Borneo, distinguished particularly by its elongated nose, its shortened thumbs, and its elongated tail. The general color is a lightish red.

PROBUS, MARCUS AURELIUS, a Roman emperor; born in Sirmium, Pannonia; early entered the army, and attracted the notice of the Emperor Valerian. He distinguished himself on the Danube, and in Africa, Egypt, Asia, Germany, and Gaul. By the Emperor Tacitus he was appointed governor of the Asiatic possessions of Rome, and on the latter's death was called to the throne (A. D. 276). His brief reign was brilliant; the Germans were driven out of Gaul, and the barbarians from the Rhætian, Pannonian, and Thracian frontiers; and Persia was forced to accept peace. Probus devoted himself to the development of its internal resources.

He employed the soldiers as laborers in executing various extensive and important works, occupations considered as degrading by them; and a large body of troops engaged in draining swamps murdered the emperor in 282.

PROCEDURE, CIVIL, the method of proceeding in a civil suit throughout its various stages.

PROCESS, in anatomy, an enlargement, such as the cygomatic process of the temporal bone, the vermiform process of the cerebellum, etc. In botany, any extension of the surface; a protrusion whether natural or monstrous. In law, a term applied to the whole course of proceedings in a cause, real or personal, civil or criminal, from the original writ to the end of the suit.

PROCESSIONAL, a service book of the Roman Catholic Church, for use in religious processions.

PROCHLORITE, a species of chlorite, consisting of a hydrated silicate of alumina, iron and magnesia. Crystallizes in the monoclinic system. It occurs in granular or foliated masses, is green in color, and may be either opaque or translucent.

PROCIDA, an islet of Italy, between the island of Ischia and the mainland (Cape Miseno), 12 miles W. by S. of Naples; area, 1½ square miles; pop, about 15,000. On its shores is the city of the same name, with a harbor, a royal palace, a State prison, and a marine school. The people fish coral, tunny, and sardines, and grow fruits, wine, and oil. The island was occupied by Great Britain on two or three occasions between 1799 and 1813. Pop. about 5,000.

PROCLUS, a Greek philosopher of the Neo-Platonic school; born in Byzantium in 412; was educated at Alexandria and Athens. As a teacher at Athens he was very successful. He not only endeavored to unite all philosophical schemes, but made it a maxim that a philosopher should embrace also all religions by becoming infused with their spirit. His works include a "Sketch of Astronomy," in which he gave a short view of the systems of Hipparchus, Aristarchus and Ptolemy; "The Theology of Plato," "Principles of Theology," a "Life of Homer," etc. He died in Athens in 485.

PROCONSUL, in Roman antiquity, an officer who, though not actually holding the office of consul, exercised in some particular locality all the powers of a consul.

PROCTER, ADELAIDE ANNE, an English poet; daughter of Bryan W.; born in London, England, Oct. 30, 1825. She wrote "Legends and Lyrics" (1858), which went through nine editions in seven years; and a second series (1860), which had a like success. She died Feb. 3, 1864.

PROCTER, BRYAN WALLER, pseudonym BARRY CORNWALL, an English poet; born in London, Nov. 21, 1787. Educated at Harrow, with Byron and Peel for schoolfellows, he studied law, and in 1815 began to contribute poetry to the "Literary Gazette." He published four volumes of poems, and produced a tragedy at Covent Garden. He was called to the bar in 1831. His works comprise "Dramatic Scenes" (1819), "A Sicilian Story" and "Marcian Colonna" (1820), "The Flood of Thessaly" (1823), and "English Songs" (1832), besides memoirs of Kean (1835), and Charles Lamb (1866). He died Oct. 5, 1874.

PROCTOR, in English law, a person employed to manage another's cause in a court of civil or ecclesiastical law. He answers to an attorney at common law. In an English university, two officials chosen from among the Masters of Arts to enforce the statutes, and preserve good order and discipline. In an American university, an executive officer whose duty it is to preserve order and enforce the laws of the institution. Proctors of the clergy, in England, clergymen elected to represent cathedral or other collegiate churches, and also the common clergy of every diocese in convocation.

PROCTOR, EDNA DEAN, an American poet; born in Henniker, N. H., Sept. 18, 1829. Her works are: "Poems" (1866); "A Russian Journey" (1872); "The Song of the Ancient People" (1892); "Mountain Maid and Other Poems of New Hampshire" (1900); etc.

PROCTOR, REDFIELD, United States Senator and Cabinet officer; born in 1831, at Proctorsville, Vt., and graduated from Dartmouth College in the class of '51. He attained the rank of colonel by a four years' service in the Civil War. After the war he devoted himself to the practice of law, and to the development of his interests in the stone quarries of his State. In 1878 he was chosen governor of Vermont; in 1889 President Harrison appointed him Secretary of War, and he resigned this office to become United States Senator, a position which he held until his death in 1908.

PROCTOR, RICHARD ANTHONY, an English astronomer, author of a large number of popular works, principally on

astronomy; born in London, England, March 23, 1837. He was a graduate of St. John's College, Cambridge, in 1860. About 1885 he settled in St. Louis, and later moved to Florida. His principal popular books are the following: "Saturn and Its System," "Half-hours With the Telescope," "Half-hours With Stars," "Other Worlds Than Ours," "Light Science for Leisure Hours," "Elementary Astronomy," "Chance and Luck," "First Steps in Geometry," "Easy Lessons in Differential Calculus," and "Old and New Astronomy." He edited "Knowledge." He died in New York City, Sept. 12, 1888.

PROFIT, any advantage, benefit, or accession of good resulting from labor or exertion; valuable results, useful consequence, benefit, gain; comprehending the acquisition of anything valuable or advantageous, corporeal, or intellectual, temporal or spiritual. Net profit, the difference in favor of the seller of any commodity between the price at which it is sold, and the original cost of production, after deduction of all charges.

PROFIT SHARING, a feature of the general efforts being made to reconcile the interests of capital and labor, whereby the employees of a factory, or any commercial establishment, are given a share of the net profits produced by the business. Profit sharing was first advocated by a small group of English social reformers, in the middle of last century, most conspicuous of which were Thomas Hughes, author of "Tom Brown's School Days," and the famous novelist, Charles Kingsley. They believed that the workers in factories and other productive manufacturing plants should not only receive a share of the net profits of the business, but should also have a voice in conducting it. This latter feature has very seldom been attempted by private business establishments, but it is commonly practiced in the so-called "self-governing workshops," co-operative groups of workingmen who also furnish the capital with which the business is run.

Profit sharing was extensively tried out by corporations in England, a generation ago, but is less commonly practiced now than then. In this country the practice has been more widely adopted, and is now being advocated as a solution of the conflicting interests between employers and employees. Many corporations see in it, if not such a solution, at least a preventative against strikes and general social unrest. Most conspicuous have been the examples of the United States Steel Corporation and the Ford Motor Works, in Detroit, Mich. In the steel plants a finance committee, composed of officials of the corporation and its employees, allocate a certain percentage of the net profits of the year's business to a fund which is divided among a certain class of the employees as a bonus on wages. The employees are encouraged to allow this money to serve as payments toward the purchase of stock in the corporation, the object being to make them part owners in the business, therefore to arouse in them a sense of common interest.

Profit sharing in the Ford Motor Works was first instituted in 1914, when $20,000,000 was equally divided between the dividends to invested capital and the employees, the latter, numbering 15,000, sharing in the $10,000,000 in proportion to the amount of their wages.

Organized labor, as a whole, has taken a very strong stand against profit sharing as an institution. The contention of the representatives of the labor organizations is that, while profit sharing gives the workers no control in the management of the business, it creates in them a sense of dependence on their employers which militates against the interests of labor organization. The corporation which can afford to share profits, labor men contend, can afford to pay better wages. The tendency is, they say, to decrease wages where profit sharing is in practice and then, when once established, the workers may be cheated of their bonus by dishonest bookkeeping.

PROGNATHIC, or PROGNATHOUS, in ethnology, a term applied to the skull of certain races of men in whom the jaw slants forward by reason of the oblique insertion of the teeth.

PROGRESSION, the act of progressing, advancing, or moving forward; progress, advance. In mathematics, regular or proportional advance by increase or decrease of numbers. A series in which the terms increase or decrease according to a uniform law. There are two kinds of progressions, arithmetical and geometrical. In music, there are two kinds of progression, melodic and harmonic. The former is a succession of sounds forming a tune or melody, but the term is also applied to an imitative succession of melodic phrases, that is, to a melodic sequence. Harmonic progression is the movement of one chord to another, and is diatonic or chromatic. The term is also sometimes used as synonymous with sequence.

PROGRESSIVE PARTY, an American political party that figured very

largely during the presidential election of 1912. The origin of the party came from the group of Progressive Republican senators and congressmen who opposed President Taft's attitude toward the tariff and the conservation of natural resources, regarding his position as too conservative and reactionary. In the pre-convention primaries of 1912 this group of Republicans persuaded ex-President Roosevelt to become their leader and to again become a candidate for the Republican nomination. Due largely to the forceful personality of Roosevelt and his vigorous campaigning he was able to win sweeping victories in every state where presidential preference primaries were held and came to the Republican convention with nearly half of that body pledged to his nomination. The conservative leaders of the party by the use of the national committee decided all of the contested delegations from the south in President Taft's favor, and thus were able by a narrow margin, to control the convention and re-nominate the President.

Roosevelt and his fellow progressives denounced the action of the leaders as fraud and decided to form a third party which should embody in its platform their principles and nominate their leader. Accordingly in August, 1912, the Progressive party was formed at a convention held in Chicago and Roosevelt was named for President, and Governor Hiram Johnson of California, for Vice-President. The platform contained the creed of the Progressives. It declared in favor of the direct election of Senators, presidental preference primaries, the initiative and referendum, maximum safety and health standards for laborers, prohibition of child labor and night work for women, minimum wage standards for women, woman suffrage, and the recall of judicial decisions. The convention of the party was characterized by a high note of idealism and an almost religious fervor. Although not expected to be much of a factor in the race, the popularity and personality of their candidate and their excellent organization made them formidable competitors. The Progressives expected to draw many votes from the Democratic as well as the Republican party, but the nomination of Governor Wilson, himself regarded as a progressive by the Democrats, largely confined the Progressives to dissatisfied Republicans and moderate Socialists.

During the excitement of the campaign, an attempt was made to assassinate Roosevelt. Although he ultimately recovered in time to close the campaign, it took him out of the race at a critical time. The result of the election was that although the Democrats won the election by an overwhelming vote in the electoral college, the Progressives polled a larger popular and electoral vote than the Republicans.

After 1912, the enthusiasm for the new party steadily waned, President Wilson's policies uniting the Progressives and Republicans in opposition. In 1916 the conventions of the two parties were both held in Chicago at the same time, and the Progressives, under the leadership of Roosevelt, decided to support the Republican candidate, Justice Hughes. Although quite a few Progressives were dissatisfied with this merger, they were not numerous or influential enough to carry forward the new party.

PROHIBITION, legislation forbidding the manufacture of and trade in alcoholic liquors, or even, in some cases, rendering the private possession of such liquors illegal. Though the use of spirituous liquors is as ancient as history, the idea of checking their use by legislation is of comparatively recent origin. It has required the investigations of modern medical science to show the tremendous harm done to human well-being and physical health by the unrestrained use of alcoholic beverages. With this knowledge, there has been a general awakening on the part of all peoples to a realization of this evil as preventable, and it may now be said that the sentiment for prohibition is as widespread as civilization itself.

In this country there was already a prohibition movement before the Civil War, which took concrete form in the heavy licensing of saloons, with local option legislation in many small communities. The first legislation of more than local character, however, was undoubtedly the laws forbidding the sale of liquors to the Indians. The first State to take action was Maine. Here the evil results of drunkenness was especially obvious, on account of the large quantities of rum brought into the state by the traders sailing between Maine ports and the West Indies. A strong agitation for legislation began in 1846, with the result that in 1851 a law was passed prohibiting the manufacture of and traffic in all intoxicating liquors. This law was later incorporated into the state constitution by amendment. In 1852 Rhode Island, Massachusetts and Vermont also passed prohibition laws, but these were soon after repealed by the two latter states. Beginning in the early eighties, a strong movement for prohibition began to make headway in the Middle West,

and during the next few years laws were passed in Kansas, Iowa, North and South Dakota. Iowa later modified her legislation, through the Mulct Law, passed in 1894, which sought to institute a system of heavy licensing, instead of pure prohibition. The two Dakotas later completely repealed their prohibition laws, but North Dakota again passed over to the "dry" States in 1914. Oklahoma went dry in 1907, and Idaho in 1915.

Shortly after 1900 a growing sentiment against the liquor traffic became manifest in the South. While moral considerations undoubtedly had their influence, this sentiment was also influenced by the fact that it was becoming obvious to the Southerners that the Negro problem was becoming more difficult on account of the growing intemperance of the Negroes. In 1907 Georgia passed a law for prohibition, and a few months later Alabama followed her example. Alabama, however, virtually repealed her law in 1911, only to re-enact it again in 1915. Then followed Mississippi and North Carolina, in 1908; West Virginia, in 1912; Virginia, in 1914; Arkansas and South Carolina, in 1915. Meanwhile, in the West, Arizona, Colorado, Oregon and Washington joined the prohibition States in 1914.

Behind this growing popular sentiment pushed the propaganda of two strong organizations; the Prohibition party, which carried on an intensive agitation during all the elections; and the Anti-Saloon League. Of the two the latter undoubtedly made the stronger appeal, especially to the women, who, better than the men, perhaps, understood the demoralizing influence of the saloon on American youth, and on American politics. As one State after another passed laws granting suffrage to women, the political power of the Prohibition movement also grew.

To the above States, which had passed prohibition laws, should be added those which passed local option laws; legislation allowing each community to decide for itself the question of whether prohibition should prevail in its own domain. These were Delaware, Alabama and Kentucky. Altogether there were in 1915 only three States which had not passed some kind of legislation against intoxicating liquors, these three being Pennsylvania, New Jersey and Nevada.

Early in 1917 a constitutional amendment was presented to Congress, but failed to pass by the necessary two-thirds majority. On December 17, 1917, it was again presented, and this time it passed both the House and the Senate. On Nov. 1, 1917, Congress enacted the necesary legislation to bring the District of Columbia over into dry territory. Meanwhile, also, on Sept. 8, 1917, war prohibition was instituted, forbidding the further manufacture of spirituous liquors, with the exception of beer and the lighter wines, this modification being made through the personal influence of President Wilson. Another important piece of legislation passed in 1917 was the Reed Amendment to the Bankhead Bill, going into effect July 1, which forbade the shipment of liquors into States where prohibition legislation had already been enacted.

During 1918 the national amendment for prohibition was ratified by the legislatures of 15 States, though only 11 of these were in regular session, indicating that special sessions had been called in four cases. Five new States were also added to the completely dry list: Florida, Nevada, Ohio, and Wyoming, these by constitutional amendments, and Texas, by a statutory measure. Minnesota was only saved from going dry by the fact that the majority of 16,000 voters who voted in favor of it were not a majority of the general electorate, the law being that a majority of the voters in the State must pass it, and not a majority of those who voted specially for the measure. Porto Rico and Alaska, of the outlying possessions, also went dry.

On Jan. 16, 1919, the required ratification of three-fourths of the States was secured by the act of the Nebraska Legislature, and on January 29 the amendment to the Constitution of the United States, declaring illegal the manufacture and sale of all alcoholic liquors, was adopted and incorporated within the basic laws of the nation, to take effect on Jan. 16, 1920. Eventually the amendment was ratified by all except three States.

PROJECTILE, a body projected or impelled forward by force, especially through the air. Thus, a stone discharged from a sling, an arrow from a bow, and a bullet from a rifle, are all projectiles, but the term is more particularly applied to bodies discharged from firearms.

PROJECTILES, THEORY OF, that branch of mechanics which treats of the motion of bodies thrown or driven some distance by an impelling force, and whose progress is affected by gravity and the resistance of the air. The most common cases are the balls projected from cannon or other firearms. If thrown horizontally, the body will move in a curved path, while it falls faster and faster toward the ground. A body pro-

jected obliquely has initially a certain horizontal velocity and a certain vertical velocity. It retains its horizontal velocity unchanged, but its vertical velocity is altered by the force of gravity, and in both of these cases we find that the path of the projectile is a parabola. With a given velocity the greatest range of a projectile is obtained by projecting at an angle of 45° with the vertical.

The velocity of projectiles fired from modern guns ranges from 1,500 to 3,000 feet per second. It is computed that the average velocity of the larger guns on the cruiser "New York" is 2,100 feet per second. Our small arm shoots a bullet only one-third of an inch in diameter, which travels 2,000 feet in a second, or a mile in three seconds. It goes so fast that it becomes hot to the touch, due to the resistance of the air which it pushes aside. Strange to say, the heated bullet will cauterize the wound of its own making and few of the wounded in the Spanish-American War in 1898 bled to death, except where struck in a vital spot.

Rotational Velocity.—The projectile has, besides the forward velocity, a rotational velocity, which is given to it by the rifling of the gun. Otherwise, since its length is much greater than its diameter, it would soon begin to turn end on. The rifling prevents this by causing the bullet to bore a path through the air, and the higher the forward velocity the higher, too, must be the rotational.

PROJECTION. (1) The act of projecting, shooting, or throwing out or forward. (2) The state or condition of projecting or extending out farther than something else; a jutting out. (3) A part which projects or extends out farther than something else; a portion jutting out; a prominence. (4) The act of projecting, planning, devising, or contriving; contrivance. (5) A plan, a project, a scheme, a design. (6) The representation on a plane surface of the parts of an object; especially the representation of any object on a perspective plane.

PROLAPSUS, in pathology, a protrusion, as well as a falling down, of a part of some entrail, so as to be partly external, or uncovered, thus differing from procidence.

PROLOGUE, a preface or introduction to a discourse or performance; especially an introductory discourse or verses spoken before a dramatic performance or play begins.

PROME, capital of the district of Prome, Lower Burma, India, on the Irrawaddy, 160 miles N. of Rangoon. Buildings include a splendid Shevesandau Pagoda, with 83 gilded temples, administration offices, markets, and a Christian church. Industries of district comprise rice, sugar, silk, cotton. Former capital of Prome kingdom. Taken by British in 1825. Pop. about 27,500.

PROMEROPS, in ornithology, the sole genus of the *Promeropinæ.*

PROMETHEUS, in mythology, the son of the Titan Japetus, was brother to Atlas and Epimetheus, and surpassed all

PROMETHEUS AND THE OCEANIDS

mankind in cunning. He ridiculed the gods, and deceived Jupiter himself. To punish Prometheus and the rest of mankind, Jupiter took fire away from the earth; but Prometheus climbed to the heavens, by the assistance of Minerva, and stole fire from the chariot of the sun. Jupiter ordered Vulcan to make a woman of clay and endowing her with life sent her to Prometheus. Prometheus suspecting the snare, induced his brother to marry her, when the god, still more irritated, caused this wily mortal

to be tied to a rock on Mount Caucasus, where, for 30,000 years, a vulture was to feed on his liver. He was delivered 30 years afterward, by Hercules.

PROMISSORY NOTE, a written promise to pay a given sum of money to a certain person, at a specified date. The phrase "for value received" is usually inserted.

PRONG-HORN ANTELOPE, inhabiting the W. parts of North America, from 53° N. to the plains of Mexico and California. It is rather more than four feet

PRONG-HORN ANTELOPE

in length. Pale fawn above and on the limbs; breast, abdomen, and rump white. The horns are branched.

PRONOUN, a word used in place of a noun or name. Pronouns in English are divided into: (1) Personal, (2) Demonstrative, (3) Interrogative, (4) Relative, and (5) Indefinite. Interrogative pronouns are those which serve to ask a question, as who? Indefinite pronouns, or such as do not specify any particular object, are used, some as substantives, some as adjectives; as, any, aught.

PROOFS, CORRECTION OF. The corrections to be made on a "proof" of printed matter are marked on the margin; and for this purpose an established set of signs is used. The following specimens of a proof exhibits the application of most of these signs:

"To rule the nations with imperial	
swǿy, to impose terms of peace, to	1 *a*
spare the humbled, and to rcush the	2 *tr.*
proud, resigning itto others to de-	3 #
scribe the courses of the heavens, and	4 ⌊
explain the rising stars; this, to use	
the words of the poet of the Æneid	5 *Italic.*
in the apostrophe of Anchises to	
Fabius in the Shades was regarded	6 ,/
as the proper province of a Roman.	5 *S. caps.*
The genius of the people was ~~even~~	7 *stet.*
more adverse to the cultivation of the	8 9
physical sciences than that the Euro-	9 *of*
pean Greeks and [seen] we have] that	6 ;/ 2 *tr.*
the latter left experimental philosophy	
chiefly in the hands of the Asian and	10 *wf.*
African colonists. The elegant litera-	6 ⊙
ture and metaphysical speculations	11 δ
of Athens, her histories, dramas, epics,	2 *tr.*
and orations, had a numerous host of	
admirers in Italy, but a *feeling* of	12 *Roman*
indifference was displayed to the	
practical science of Alexandria. ["This	13 ¶
repugnance of the Roman mind at	14 *and its*
home to mathematics and physics,	*despotism*
extending from the Atlantic to the	*abroad,*
Indian Ocean, from Northern Britain	3 # 15 ⊃
to the cataracts of the Nile, annihi-	
lated in a measure all pure sciences	16 *the*
in the conquered districts where they	17
had ~~had~~ been pursued, and prohibited	11 δ
attention to them in the mother	18 -/
country.	19 *Run on*
Long, indeed, after the age of	
Ptolemy, the school in connection	5 *Caps.*
with which he flourished, remained	
in existence; &c.	20 ⋎

(1) A wrong letter. After every mark of correction a line | should be drawn, to prevent its being confounded with any other in the same line. (2) A word or letter to be transposed. Where letters only are to be transposed, it is better to strike them out, and write them in their proper sequence in the margin, like a correction. (3) A space wanted. This mark is also used when the spacing is insufficient. (4) A space or quadrant sticking up. (5) Alteration of type. One line is drawn under the word for *italics*, two for SMALL CAPITALS, three for CAPITALS. (6) Correction or insertion of stops. (7) A word struck out, and afterward approved of (Latin *stet*, "let it stand"). (8) A turned letter. (9) An omission. (10) A letter of a wrong font. (11) A word or letter to be deleted. (12) Alteration of type. (13) A new paragraph. (14) Insertion of a clause. (15) A space to be removed or diminished. (16) A wrong word. (17) When letters or lines do not stand even. (18) Mark for a hyphen. (19) No new paragraph. (20) The manner in which the apostrophe, inverted commas, the star and other references, and superior or "cock-up" letters and figures are marked.

PROPERTIUS, SEXTUS AURELIUS. a Roman poet; born in Melvina, about 52 B. C. Nothing more of his life is known than that, after the end of the civil war, he found a patron at Rome, in Mæcenas, through whom he obtained

the favor of the emperor. His life appears to have been a series of amours, and his "elegies" are expressions of his passion.

PROPERTY TAX, a rate or duty levied by the State, county, or municipality on the property of individuals, the value of the property being fixed by assessment.

PROPHETS, THE, men divinely inspired, and who often uttered predictions of future events. Three Hebraic words are applied to the Old Testament prophets; the most common is *nabhi*, from the verb *nabha* = primarily, to bubble forth, to send forth copious floods of speech, hence in Niphal=to speak under a divine impulse, to prophesy.

PROPORTION, a word with several applications.

In archæology, art, etc., that due observance of the balance of parts, in a statue or picture, which constitutes excellence. In arithmetic, a rule by which from three given quantities a fourth may be found bearing the same ratio to the third as the second bears to the first. Also called the Rule of Three. In mathematics, the relation which one quantity bears to another of the same kind, with respect to magnitude or numerical value.

Compound proportion, the equality of the ratio of two quantities to another ratio, the antecedent and consequent of which are respectively the products of the antecedents and consequents of two or more ratios. Reciprocal proportion: a proportion in which the first term is to the second as the fourth to the third, 4:2::3:6. Rhythmical proportion in music. The proportion in relation to time or measure between different notes representing durations; thus, the semibreve is to the minim as 2:1, the semibreve to the crotchet as 4:1. Simple proportion: The relation of equality subsisting between two ratios.

PROPORTIONAL REPRESENTATION, an idea of representation a realization of which would insure the presence in a representative assembly of members divided in opinions in the same proportion in respect of numbers as the community represented.

PROPOSITION, in geometry and mathematics, a statement in terms of something proposed to be proved or done. In grammar, a sentence, or part of one, consisting of a subject, a predicate, and copula. In logic, a sentence, or part of a sentence, affirming or denying a connection between the terms; limited to express assertions rather than extended to questions and commands. In poetry, the first part of a poem, in which the author states the subject or matter of it. In rhetoric, that which is proposed, offered, or affirmed, as the subject of a discourse or discussion.

PROPYLAEUM, in Greek architecture, a portico in front of a gate or temple doorway; the entrance to a Greek temple, a sacred inclosure, consisting of a gateway flanked by buildings.

PROSECUTION, in law, (1) the instituting and carrying on of a suit in court of law or equity to obtain some right, or to redress and punish an injury or wrong. (2) The act or process of exhibiting formal charges against an offender before a legal tribunal, and pursuing them to final judgment; the instituting and continuing of a criminal suit against any person or persons. (3) The party by whom criminal proceedings are instituted; the prosecutor or prosecutors collectively.

PROSELYTE, a new convert to some religion, sect, opinion, party, or system.

PROSERPINE, in mythology, a daughter of Ceres and Jupiter, of extreme innocence and beauty, and who, while gathering flowers in the lovely vale of Tempe, was carried off by the god of the infernal regions, Pluto. The prayers and intercessions of her mother ultimately prevailed on Pluto to permit her to spend half of each year on earth.

PROSKUROV, a town in Podolia, Russia, near the confluence of Ploskaya and the Bug, on the railway from Odessa to Lemberg. Its manufactures include sugar, flour, tobacco, oil and pottery, while market gardening is extensive in district. Buildings are mostly of wood, with Orthodox Cathedral. Jews, who number half of the population, carry on export trade. Pop. about 45,000.

PROSODY, that part of grammar which treats of the quantities of syllables, of accent, and of the laws of versification.

PROSOPOPEIA, or **PROSOPOPŒIA**, in rhetoric, a figure by which things are represented as persons, or inanimate objects as animate beings, or by which an absent person is represented as speaking, or a deceased person as alive and present. It is more extensive than personification.

PROSSNITZ, a town in Moravia, Czecho-Slovakia, on the Rumza, 12 miles S. W. of Olmütz. Buildings include town hall, large grain market, fine church and schools. Is center of prosperous and fruitful region. Its indus-

tries include wool, cotton, linen, liquors, tools, and geese breeding. Pop. about 35,000.

PROSTATE GLAND, the largest of all the organs connected with the male generative system.

PROSTITUTION. In law, the common lewdness of a woman for gain. The act of permitting a common and indiscriminate sexual intercourse for hire.

PROSTYLE, in architecture, a temple which has a portico in one front, consisting of insulated columns with their entablatures and fastigium. Also a portico in which the columns stand out quite free from the walls of the building to which it is attached.

PROTAGORAS, a Greek sophist; born in Abdera, 480 B. C. He was taught by Democritus, and became a teacher at Athens, and was banished on the charge of atheism. Plato has illustrated the doctrines and the fame of this sophist in the dialogue named after him. None of the writings of Protagoras are extant. He died probably about 411.

PROTEACEÆ, proteads; shrubs or small trees, with hard dry leaves. From the Cape of Good Hope and Australia. Known genera 44, species 650.

PROTECTION, one of the theories concerning the best development of a country's industries by means of taxes levied for other than fiscal purposes.

Incidental protectionists deny and limited protectionists affirm the wisdom of levying tariff duties with the intention and purpose of protecting home industries. The limited protectionists would have the legislation of the state take particular cognizance of the character of the industries of the people, and would have the law enacted with constant reference to the encouragement of the weaker—generally the manufacturing—pursuits. The doctrine of incidental protection is to "let alone" so far as the original purpose of legislation is concerned, but would at the same time so shape the tariff that a needed stimulus should be given to certain industries. The limited protectionist agrees with the free-trader in assenting to the proposition that the original condition of industry is found in nature—in the environment of the laborer, also that the necessity for a varied industry is so great, so important to the welfare and independence of a people, as to justify the deflection of human energies by law to certain pursuits which could not be profitably followed but for the fact of protection. This makes a reason for tariff legislation. The weaker industry lives and thrives by the side of the stronger and thus modifies the crude rules of nature by the higher rules of human reason. The protectionist would keep in view the strength and dignity of the State and would be willing to incur temporary disadvantages for the sake of a permanent good.

The doctrine of high protection is that the assumptions of free trade are specious and false. The influence of man on his environment is so great as to make it virtually whatever the law of right reason would suggest, namely, that every nation should be independent. Its sovereignty and equality should be secured by every means short of injustice. In order that a State may be independent and able to make out for itself a great destiny, its industries must afford employment for all the talents and faculties of man, and yield products adapted to all his wants. To devote the energies of a people to those industries only which are suggested by the situation or environment is to make a man a slave to nature instead of nature's master.

Not only should every state, but every community, be made comparatively independent. Every community should be able, by its own industries, to supply at least the larger part of its own wants. This cannot be accomplished in any other way than by the legal protection of those industries which do not flourish under the action of merely natural laws. Internal trade is, according to this doctrine, the principal thing, and commercial intercourse with foreign states a matter of secondary or even dubious advantage. If the price of the given home product be not sufficient to stimulate its production in such quantities as to meet all the requirements of the market, then that price should be raised by means of legislation, and raised again and again, till the foreign trade shall cease, and home manufacture be supplied in its place.

PROTECTIVE ASSOCIATION, AMERICAN, a league composed of over 25,000 American volunteers, formed in March, 1917, to aid the Government in putting down sedition and espionage. Mr. A. Briggs was made chairman of the volunteer auxiliary. The first working unit of the league was organized in Chicago, with Mr. Frey as its head. The association was built on military lines; every large city forming a division; each division made up of several districts, with a captain over each unit. The executive control was centralized in a Board of National Directors, whose

headquarters were at Washington, D. C. The league co-operated with the Department of Justice, Red Cross, Y. W. C. A., Army Intelligence, Navy Intelligence, Alien Property Custodian, Shipping Board, Food Administration, Jewish Welfare Board, and various other organizations.

PROTECTOR, in English history, one who had the care of the kingdom during the minority of the king; a regent; specifically applied to Oliver Cromwell, who took the title of Lord Protector in 1653. In ecclesiology, a cardinal belonging to one of the more important Catholic nations, who, in Rome, watches over questions affecting his country. There are also cardinal protectors of religious orders, colleges, etc.

PROTEINS, a class of complex substances occurring in plants and animals, and differing from the other main constituents (carbohydrates and fats) in that they contain nitrogen. They are also known under the name of proteids, albumens and albumenoids, but there is a tendency to call the nitrogenous constituents, as a class, "proteins," restricting the terms "albumen" and "albumenoids" to sub-groups. Of all the constituents of food the proteins are the most important. Without them life is impossible, for it is the proteins which build the tissues and repair the waste of daily life. On the other hand, with protein, water and a little mineral matter, life can be maintained indefinitely. Flesh foods of all kinds, including fish, are high in protein, as are also eggs, nuts, cheese and peas and beans. It is estimated that an adult requires, on the average, 120 grams of protein daily. In the body, proteins are decomposed into peptones and then to amino acids, in which form they are carried by the blood to the tissues, any excess being converted into urea by the liver, this, in turn, being excreted by the kidneys.

The chemical nature of proteins has been investigated by the famous German chemist, Emil Fischer, and his pupils. More than fifty different varieties have been identified. A classification of these varieties was made by a joint committee of the Chemical and Physiological Societies of London, and was submitted to American scientific bodies for criticism. As amended and completed by the latter, the classification divided the proteins into the following groups.

A. *Simple Proteins*, in which group are included the protamines, histones, albumins, globulins, prolamines, glutelins and sclero-proteins (or albumenoids).

B. *Conjugated Proteins*, consisting of those proteins having, in combination, other groups, such as carbohydrates, phosphorus, etc., and including the nucleoproteins, glycoproteins, hæmoglobins, phosphoproteins and lecithoproteins.

C. *Derived Proteins*, consisting of compounds derived from proteins by hydrolysis.

D. *Proteans or Metaproteins*, including coagulated proteins, proteoses, peptones, etc.

Proteins as a class are distinguished by the large size of their molecules, which renders possible their separation from simpler substances by dialysis, the smaller molecules passing through the dialyzer, while the larger protein molecules are retained. In other respects the proteins of the various groups differ greatly in their chemical and physical characteristics. Some (*e. g.* horn) are insoluble in all solvents; others, such as egg albumin, are soluble in water; still others, of which the globulins are an example, are insoluble in pure water, but soluble in salt solutions. Nearly all the soluble proteins can be precipitated from their solutions by the addition of salts, although, here again, there is great variation in their behavior with different salts, and in the amount of the salt necessary to bring about the precipitation. It was formerly believed that no proteins could be obtained in crystalline form, but of recent years, egg albumin and serum have both been crystallized, the method employed being to mix the protein with an equal bulk of concentrated ammonium sulphate solution, filter, and acidify the filtrate with acetic or sulphuric acid.

PROTEST, ordinarily, a solemn affirmation or declaration of opinion (frequently in writing), generally in opposition to some act or proposition; a solemn affirmation by which a person declares either that he entirely dissents from and disapproves of any act or proposition, or else only conditionally gives his assent or consent to an act or proposition, to which he might otherwise be considered to have assented unconditionally.

In commerce, a formal declaration by the holder of a bill of exchange or promissory note, or by a notary public at his direction, that acceptance or payment of such bill or note has been refused, and that the holder intends to recover all expenses to which he may be put in consequence of such non-acceptance or non-payment.

In marine insurance, a declaration made on oath by the captain of a vessel which has met with any disaster at sea, or has been compelled to run into a foreign or intermediate port for safety.

The protest should be made as soon as he enters the port, . . . the limit usually assigned being within 24 hours of his arrival.

The word is also applied to a declaration made by a party before or while paying a tax, duty, or the like demanded of him which he deems illegal, denying the justice of the demand, and asserting his own rights and claims in order to show that the payment was not voluntary.

PROTESTANT, one who protests. In Church history, the name given to those princes and others who, on April 19, 1529, at the second diet of Speyer, protested against the decision of the majority, that the permission given three years before to every prince to regulate religious matters in his dominions till the meeting of a General Council should be revoked, and that no change should be made till the council met. Besides protesting, they appealed to the emperor and to the future council. The diet rejecting their protest, they presented a more extended one next day. Those first Protestants were John, Elector of Saxony; the Margrave George of Brandenburg, Onolzbach, and Culmbach; the Dukes Ernest and Francis of Lüneburg; the Landgrave Philip of Hesse; Wolfgang, Prince of Anhalt, and the representatives of the imperial cities of Strassburg, Ulm, Nuremberg, Constance, Reutlingen, Windsheim, Memmingen, Lindau, Kempten, Heilbronn, Isny, Weissenburg, Nördlingen, and St. Gall. The name is now extended to all persons and churches holding the doctrines of the Reformation and rejecting papal authority.

PROTESTANT EPISCOPAL CHURCH, a denomination in the United States directly descended from the Church of England, which doctrinally claims to be based on the Holy Scriptures, as interpreted in the Apostles and other ancient creeds of the Church that have been universally received, and to have kept herself aloof from all the modern systems of faith, whether of Calvin, or Luther, or Arminius, leaving her members free to enjoy their own opinions and refusing to be narrowed down to any other creed or creeds than those of the Apostles and the Primitive Church. She claims also to have retained all that is essential to church organization in her episcopate, and in her liturgy to have not only a wise and judicious compend of doctrine and devotion, but also one of the most effectual of all possible conservative safeguards for the faith once delivered to the saints. The characteristic tenets of the Church of England, besides the fundamental doctrines of the Trinity and redemption through the all-sufficient atonement once made for all by the death of Christ on the cross, are a regeneration or spiritual birth in baptism, in which the baptized becomes a member of the Church, and a growth in grace by the use of the sacraments and ministrations of the Church duly administered and duly received, made efficacious by the word of divine truth and the gracious influences of the Holy Ghost, freely given to all who duly seek and faithfully use them. The Church has power to decree rites or ceremonies, and to decide matters of faith; clergymen are allowed to marry; and communion is to be given in both kinds. The number of sacraments is two—baptism and the Lord's Supper. Three clerical orders are recognized—bishops, priests, and deacons. Those of the second order are entitled archdeacons, deans, rectors, vicars, or curates, according to their functions.

From the time of the first congregations of the Church of England in America, in 1607, to the close of the Revolution, all the clergy in the colonies were regarded as under the supervision of the Bishop of London. The first American bishop was Rev. Samuel Seabury, who, in 1783, was consecrated in Scotland as Bishop of Connecticut. All Protestant Episcopal churches in the United States are associated in one national body, called the General Convention, which meets triennially. The General Convention directs the manner in which the qualifications of candidates for orders shall be estimated and determined; regulates the particulars in regard to the election and ordination of the orders of the ministry; defines the nature of ecclesiastical offenses, and decrees the punishment thereof; settles the particular form and orders of its common prayer, and publishes authorized editions of the Book of Common Prayer; and directs the mode and manner of its intercourse with foreign churches. No law or canon can be enacted without the concurrence of both clergy and laity. In 1919 the Communicants in the United States numbered 1,098,173, the Churches 7,425, and the Ministers 5,544.

PROTEUS, in the Homeric or oldest Greek mythology, a prophetic "old man of the sea," who tends the sea flocks of Poseidon (Neptune), and has the gift of endless transformation. His favorite residence, according to Homer, is the island of Pharos, off the mouth of the Nile; but according to Vergil, the island of Carpathos (now Skarpanto), between Crete and Rhodes. Proteus was very

unwilling to prophesy, and tried to escape by adopting all manner of shapes and disguises. When he found his endeavors hopeless he resumed his proper form, and then spoke out unerringly about the future.

PROTHERO, ROWLAND EDMUND, an English historian born in 1852 at Clifton-on-Teme in Hampshire. Educated at Balliol College, Oxford, he graduated with high honors in modern history and obtained a fellowship in All Souls' College in 1875. From 1894 to 1899 he was editor of the "Quarterly Review." He became one of the principal editors of the "Cambridge Modern History," the most authoritative and scholarly of all the general modern histories in English. Among his other historical works are: "Letters of Edward Gibbon" (1896); "Life of Queen Victoria" (1897); "Letters and Journals of Lord Byron" (1900).

PROTOCOL, the original draft or copy of a deed, contract or other document. In diplomacy, the minutes or rough draft of an instrument or transaction; the original copy of a treaty, dispatch, or other document; a document serving as the preliminary to diplomatic negotiations; a diplomatic document or minute of proceedings, signed by the representatives of friendly powers in order to secure certain political ends peacefully; a convention not subject to the formalities of ratification.

PROTO-NOTARY, a member of the College of Proto-notaries Apostolic in the papal curia, whose duties are to register pontifical acts, make and keep the records of beatifications, etc.

PROTOPLASM, in biology, etc., the living matter from which all kinds of living things are formed and developed, and to the properties of which all their functions are ultimately referred. It was first noticed and described by Roesel von Rosenhof, in his account of the Proteus-animalcule, and was named sarcode by Dujardin in 1835.

PROTORNIS, a genus of Passerine birds, with one species, *Protornis glariensis,* from the Lower Eocene Slates of Glaris. It was somewhat similar to a lark, and is the earliest known Passerine.

PROTOROSAURUS, or **PROTEROSAURUS,** a genus of *Lacertilia,* founded by Von Meyer, to include what was deemed the fossil monitor of Thuringia. The neck is long, the skull of moderate size, the tail long and slender, the teeth sharp-pointed and implanted in sockets, the cervical vertebræ slightly amphicœlous.

PROTOZOA, a group of animals, occupying the lowest place in the animal kingdom. They consist of a single cell, or or a group of cells not differentiated into two or more tissues; incapable, as a rule, of assimilating nitrogen in its diffusible compounds. The food is taken into the protoplasm, either by a specialized mouth or by any part of the cell substance, in the form of particles.

PROTRACTOR, a mathematical instrument, used in drawing or plotting, for the laying down of angles. It is variously shaped, and may be circular, semicircular, or rectangular.

PROUDHON, PIERRE JOSEPH, a French publicist; born in Besançon, France, July 15, 1809. He was employed in various printing offices till 1837, but had found time to think and study. The sense of the inequality of conditions among men, and of the social stigma attached to poverty, gave permanent direction to his speculations and endeavors. In 1840 appeared his famous memoir, entitled, "What is Property?" his answer to this question, "Property is Theft," being almost all that is popularly known of him. After the revolution of February, 1848, Proudhon was editor of "The People's Representative," and attracted great attention and popularity, and was chosen member of the Constituent Assembly. But he found no hearing, and therefore started a newspaper under the title of "The People," which was suppressed. In 1849, he founded his People's Bank, but being soon after sentenced, under the press laws, to three years' imprisonment and a fine, he left France, and the bank was closed by the government. He died in Passy, France, Jan 19, 1865.

PROUT, SAMUEL, an English water-color painter; born in Plymouth, England, Sept. 17, 1783. He studied from nature, and sketched with Haydon through Devon and Cornwall, his drawings in the latter county being made for Britton's "Beauties of England and Wales." In 1805 he removed to London, in 1815 was elected to the Water-color Society. He died Feb. 9, 1852.

PROUTY, CHARLES AZRO, an American economist. Born in 1853 at Newport, Vt., he graduated from Dartmouth College in the class of '75, and was admitted to the bar in 1882. From 1888 to 1896 he held the position of reporter of the Vermont Supreme Court. President McKinley in 1897 appointed him a member of the Interstate Commerce Commission and in a few years was a recognized master of the growing problem of transportation. In 1912 he

served as chairman of the Commission. Prouty is the author of two works on economics, "Transportation—Everyday Ethics" (1910), and "The Trust Problem" (1911).

PROVENÇAL, a romance dialect that sprang up in France on the decline of literary Latin. Originally Provençal and Northern French came from the same stock, but by the 12th century they differed almost as widely as French and Italian. Owing to its rhyming facilities it was essentially the language of the troubadours and extended over the area from the Alps to the Pyrenees and the Mediterranean to the Loire, as well as in parts of Spain and Switzerland.

The first historic Provençal author was Guillem IX., Count of Poitiers, who lived toward the end of the 11th century. The following 150 years was the most brilliant period of the troubadours, and marked the highest development of Provençal. With the 13th century the real literary Provençal disappeared, but in the 19th it was again revived by such poets as Jacques, Jasmin, Romanille, Mistral, and Aubanel, who started a movement for the preservation of Provençal languages and customs. See TROUBADOUR.

PROVENCE, formerly a maritime province of France, bounded on the S. by the Mediterranean, and comprising the modern departments of Bouches du Rhône, Var, Basses-Alpes, and parts of Alpes Maritimes and Vaucluse. Provence was overrun in the 5th century by the Visigoths and Burgundians, for a time was under the Saracens, and in 879 was mostly incorporated with Cisjuran Burgundy and with it was attached to Germany. The main part of the region remained, however, under the Counts of Arles, also known as Counts of Provence, and was practically independent. Under the Angevin princes the constitution of Provence, with its three estates holding the power of the purse, was well balanced and free; and it is possible that through Simon de Montfort the English parliamentary constitution may be indebted to it. The last of the counts, Charles, grandson of René the Good, bequeathed his country to the dauphin of France; and it was united to that country in 1486 by Charles VIII.

PROVERB, an old and common saying; a short or pithy sentence often repeated, and containing or expressing some well-known truth or common fact ascertained by experience or observation; a sentence which briefly and forcibly expresses some practical truth. Unless a saying is capable of being applied to a variety of cases it can never become a proverb. Every Oriental collection abounds in proverbs like "The ant got wings to her destruction." "They came to shoe the Pasha's horses, and the beetle held out his foot," "They asked the mule, 'Who is thy father?' 'The horse,' said he, 'is my maternal uncle.'" By purists, perhaps, these and others of the same species, including the familiar "pot and kettle," may be denied a place among the proverbs proper; but they fulfill all the functions of the proverb, and they serve moreover to show how near akin are these two venerable vehicles of old-world wisdom, the fable and the proverb. We are apt to use proverbs automatically. So completely have they engrafted themselves that we talk of gift horses, and half-loaves, and a bird in the hand, and sauce for the goose mechanically and without any thought of speaking proverbially. There is no family, perhaps, that has not proverbs or rudimentary proverbs of its own, founded on some adventure or drollery or blunder of one of its members, and used proverbially by all, often to the perplexity of the uninitiated visitor; and what is true of the family is true of the community on a more extensive scale. It has its own current sayings, allusions, comparisons, similitudes, incomprehensible to the outsider, but full of meaning to all who are to the manner born.

As they pass from the family and the community to the nation, so they pass from one nation to another. The purely national proverbs form only a portion of the proverbs in any language.

It is obvious that the greater number of these proverbs which seem to be common property must be of Eastern birth. If we find a proverb in English, German, Italian, and Spanish, and also in Arabic, Persian, and Hindustani, which is the more likely—that it has passed from Europe to Asia, or from Asia to Europe? When David appealed to Saul it was with "a proverb of the ancients," and it was with proverbs that the prophets drove home their words, proverbs that are, many of them, in use there to this day, like "As is the mother, so is her daughter," and "The fathers have eaten sour grapes, and the teeth of the children are set on edge." "Judge not that ye be not judged," "The straw in another's eye thou seest, but not the beam in thine own," and others, are still current in Syria. "One sows and another reaps" and "Who makes a trap for others falls into it himself" are Turkish, and "Where the corpse is there the vultures will be" is a Bengali proverb. The proverbs that are strictly national have an interest of another kind. Coming di-

rectly from the people, the chosen vehicles of their sentiments and opinions, they naturally reflect the habits of thought, the turn of mind, the way of looking at things that prevail among those who use them.

Of the national groups the Spanish is unquestionably the most remarkable. The number of Spanish proverbs is prodigious. In any other language 5,000 or 6,000 would be a large collection, but a Spanish MS. by Yriarte, the royal librarian, which was in the Heber library, contained between 25,000 and 30,000. Language, it may be observed, plays an important part in proverbs. Take, for example, the Scotch "Better a toom house than an ill tenant." Compared with the English "empty," how much more effective is the Scandinavian "toom," to say nothing of the alliteration.

The Italian proverbs, only less numerous than the Spanish, are more remarkable for wit, often bitter, than for humor; in the French, on the other hand, there is little or none of that brilliant wit and epigrammatic neatness of expression which distinguish French literature. English, including the Lowland Scotch, must be regarded as simply a subdivision of the great Teutonic group comprising the German, the Plattdeutsch, the Dutch, the Danish, the Swedish, and the Norwegian. Each of these has, of course, its own peculiar proverbs, but in each case the main body, it will be seen on comparison, belongs to a common stock. Next to Spain, the region richest in proverbs in Europe is the Anglo-Saxon country. Compared with other groups, the Celtic proverbs must be rated as poor. The Gaelic proverbs, as Nicolson's admirable collection shows and he himself admits, have been largely recruited from Norse and Lowland Scotch sources; and the purely Celtic are to a great extent made up of sayings in praise of Fingal, or expressive of the opinion which one clan has of another, or of itself. The Welsh proverbs gathered by Howell are very flat; and of the Irish Dr. Nicolson observes that the wonder is they are so few, and those few so remarkably deficient in the wit —a remark certainly borne out by the specimens usually given, in which moral truisms of the copy book order, like "virtue is everlasting wealth," "wisdom excels all riches," "falling is easier than rising," have a decided predominance. Among the Oriental proverbs the Arabic hold the first place in respect to quantity, and perhaps quality likewise, but the Persian and Hindustani are also excellent, and in the Turkish, together with abundant worldly shrewdness, there is sometimes a vein of poetry that is very striking. It is questionable whether the "tender beauty," to use Trench's praise, of the English proverb of the shorn lamb is not rivalled by its Turkish parallel, "God makes a nest for the blind bird."

PROVERBS OF SOLOMON, one of the sacred books of the Old Testament ascribed to Solomon. The Hebrew term translated proverbs means literally a similitude or comparison of two objects, and this is the form that most of them take. Solomon, we are told, uttered 3,000 proverbs; but it has been doubted whether he ever made any collection of them in writing; and it is expressly stated that the latter part of the book, beginning with chapter xxv., was written and added by order of King Hezekiah. The title shows the author rather than the compiler. It has hardly ever been contended that a large share in the composition of the book is to be ascribed to the Wise King; and the divine authority of the book is sufficiently proved by the quotations made from it in the New Testament. In all ages this book has been regarded as a great store house of practical wisdom.

PROVIDENCE, a city, capital of the State of Rhode Island, and county-seat of Providence co.; on the Providence river, an arm of Narragansett Bay, and on the New York, New Haven, and Hartford, and the New England railroads; 44 miles S. W. of Boston. It is the second city of New England in population and wealth, and is built on a rolling plateau.

Business Interests.—Providence has upward of 2,000 manufacturing establishments, with a combined capital of about $60,000,000, and employing about 40,000 persons. It is noted for its manufactures of cotton and woolen goods, jewelry, and stoves, and is the largest seat of fine jewelry manufacture in the United States. The other industries include silverware, tools, engines, locomotives, boilers, sewing machines, screws, files, general hardware, yarn, calico, laces, braids, worsteds, broadcloth, chemicals, etc. There is an extensive coastwise commerce and shipping industry, especially in the coal, cotton, and wool trade. There is also an important shell-fish industry. Lines of steamboats run regularly to Boston, New York, Philadelphia, and Baltimore. There are 7 National and several other banks; and many daily, weekly, and monthly periodicals. The assessed property valuations exceed $235,000,000, and the net debt $14,000,000.

Public Interests.—The city has an area of 19 square miles; 268 miles of

streets, of which 74 miles are paved; a system of waterworks, owned by the city, that cost nearly $8,000,000, with 437 miles of mains; and a sewer system covering 252 miles. The streets are lighted by gas and electricity, at a cost of over $245,000 per annum; the police department costs annually about $700,000, and the fire department about $575,000. There is a public school enrollment of over 40,000 pupils; and an annual expenditure for public education of over $1,400,000. The cost of maintaining the city government exceeds $7,000,000. The death rate average 15.47 per 1,000. The city of Providence is the seat of Brown University, La Salle and St. Xavier's Academies (R. C.), Lincoln School, Academy of the Sacred Heart, Rhode Island School of Design, etc. The charitable institutions include the Rhode Island Institute for the Deaf, Dexter Asylum for the Poor, Home for Aged Men, Home for Aged Women, State Home and School for Indigent Children, Rhode Island Hospital, Butler Insane Asylum, orphan asylums, dispensaries, etc. There is also the Rhode Island State Prison. There are about 120 churches, and several beautiful parks, the most important being the Roger Williams.

History.—In 1636 Roger Williams, a Baptist clergyman, was exiled from Massachusetts because he opposed its theocratic laws. He first settled at What Cheer rock, on the Seekonk river, and later at the head of the Providence river, where the Indian chief, Canonicus, granted him a piece of land. In 1643–1644 local government was formed under a royal charter. In 1675, during King Philip's War, the city was partly burned. Providence received its city charter in 1832. Subsequently Cranston and North Providence were annexed, and a part of Johnson in 1900. Pop. (1890) 132,146; (1900) 175,597; (1910) 224,326; (1920) 237,595.

PROVISIONAL ORDER, an order granted, under the powers conferred by an act of Parliament, by a department of the government, by the Secretary of State, or by some other authority, whereby certain things are authorized to be done which could be accomplished otherwise only by an act of Parliament. The order does not receive effect, however, till it has been confirmed by the Legislature. Till that time it is purely provisional; and even after it has been so confirmed and is in reality an independent act, it retains the title of a provisional order. Provisional orders are most useful in facilitating the modification or extension of the provisions of general acts, so as to adapt them to the special necessities of particular districts. They may be obtained with much greater expedition and less cost than a private bill; the confirmatory act when unopposed may be obtained in a week or two, and has all the facilities of a government measure.

PROVO, a city of Utah, the county-seat of Utah co. It is on the Provo river, and on the Denver and Rio Grande and the San Pedro, Los Angeles, and Salt Lake railroads. It is the center of an important agricultural, fruit-growing, and cattle-raising region. Its industries include the manufacture of woolen goods, flour, iron and tin roofing, etc. It is the seat of Brigham Young University, a Mormon tabernacle, Proctor Academy, a public library, Federal building, the State Insane Asylum, etc. Pop. (1910) 8,925; (1920) 10,303.

PROVOST, the heads or principals of several colleges in the English Universities of Oxford and Cambridge; the principal of the University of Dublin. Also in England the chief dignity of a cathedral or collegiate church. In Scotch burghs, the chief magistrate, corresponding to the mayor in English boroughs. The provosts of Edinburgh and Glasgow are styled lord provosts, as the provost of Perth formerly was; the same title is popularly given to the provost of Aberdeen.

PROVOST MARSHAL, a commissioned officer specially appointed, at great permanent camps or in the field on active service, to carry out sentences of military law. Formerly they had powers of immediate punishment on the commission of offenses against published orders; but now they can only arrest, and detain for trial, offenders, and carry the punishments awarded by court-martial into effect.

PROXY, the agency of another who acts as a substitute for his principal; agency of a substitute. The person who is substituted or deputed to act for another. A writing by which one person authorizes another to vote in his place. In English law, every peer, spiritual or temporal, can constitute another lord of Parliament, of the same order with himself, his proxy, to vote for him in his absence; but proxies cannot be used when the house is in committee, nor in any judicial cause.

PRUDDEN, THEOPHIL MITCHELL, an American bacteriologist; born in Middlebury, Conn., July 7, 1849. He was Professor of Pathology in the College of Physicians and Surgeons, New

York. His works include: "Handbook of Pathological Anatomy and Histology" (1885), with F. Delafield; "Story of the Bacteria" (1889); "Dust and its Dangers" (1891); "Water and Ice" (1891); "An Elder Brother to the Cliff Dweller" (1897); "Under the Spell of the Grand Cañon" (1898); "On the Great American Plateau" (1907).

PRUD'HON, PIERRE, a French painter; born in Cluny, France, April 4, 1758; studied art at Dijon and in Rome, where he came under the influence of Correggio and of Leonardo. He latterly settled in Paris, where he became famous by his "Truth descending from Heaven," "Psyche carried off by Zephyr," "Crime pursued by Justice and Divine Vengeance," etc. He died in Paris, Feb. 16, 1823.

PRUNE, the dried fruit of *Prunus domestica,* especially of the varieties called St. Catherine and green gage. They contain a large proportion of sugar, etc., so that brandy can be distilled from them.

PRUNELLA, a smooth, dark-colored, woolen stuff, used as lasting, for making the uppers of shoes and gaiters, and for clergymen's gowns. Also spelled prunello.

PRUNING, the act of lopping or cutting off what is superfluous; specifically, the act of lopping or cutting off superfluous branches or shoots of trees, etc., with a view to strengthening those that are left, or to bringing the tree or plant to a particular form. In falconry, that which is cast off by a bird when it prunes its feathers; refuse, leavings.

PRUSSIA, the largest and most powerful State of the German republic; occupying a N. central portion of the European continent; between lat. 49° and 56° N., and lon. 6° and 23° E.; bounded on the N. by the Baltic and Denmark; on the E. by Russia and Poland; on the S. by Bohemia, Bavaria, Württemberg and Baden; and on the W. by Belgium and the Netherlands. From the extreme E. frontier of Prussia to Aix-la-Chapelle, the distance is about 775 miles, and from the promontory on the Baltic above Stralsund, to the extreme S. frontier, of Silesia, the distance is 404 miles. The length of the coast line is about 250 miles on the North Sea, and 750 miles on the Baltic. The following islands belong to Prussia: Rügen, Fehmarn, Alsen, Heligoland and the Frisian Islands. Total area, before the World War, 134,650 square miles; total population about 40,000,000. As a result of the Peace Treaty of Versailles, Prussia lost certain parts of Posen, Silesia, East and West Prussia, Schleswig, and the Rheinland, amounting to some 31,000 square miles with almost 8,000,000 inhabitants and reducing its area to about 103,000 square miles and its population to about 32,000,000.

Political Divisions.—Prussia before the World War was administratively divided into 14 provinces, which were again subdivided into 35 government districts, with the principality of Hohenzollern, the cradle of the royal family. The provinces were as follows, with population in 1910: Rhine (Rheinland), 7,120,519; Silesia (Schlesien), 5,226,311; Brandenburg, 4,093,007; Westphalia (Westfalen), 4,125,904; Saxony (Sachsen), 3,088,778; Hanover (Hannover), 2,942,546; East Prussia (Ostpreussen), 2,064,368; Posen, 2,100,044; Hesse-Nassau, 2,220,956; Berlin, 2,070,695; Pomerania (Pommern), 1,716,481; West Prussia (Westpreussen), 1,703,042; Schleswig-Holstein, 1,619,673; and Hohenzollern, 71,009. The principal cities with population for 1910 are: Berlin, 2,064,153; Breslau, 519,929; Cologne, 511,042; Frankfort-on-the-Main, 414,406; Hanover, 299,753; Magdeburg, 279,644; Düsseldorf, 356,733; Stettin, 234,033; Charlottenburg, 304,280; Königsberg, 248,059.

Topography.—The surface of the kingdom is generally level, sloping in the N. to the sea, and forming part of the great N. plain of Europe. The S. and S. W. parts of the kingdom are hilly, or even mountainous. The principal ranges are the Sudetic, the Thuringian, the Hartz, the Teutoburgerwald, the Weser, the Taunus and the Westerwald. The province of Hohenzollern is in the Swabian Alps. Prussia is well watered. The Rhenish provinces are traversed by the Rhine, while the E. frontier is partly formed by the Weser. The Elbe intersects the Saxon provinces; the Oder, which is almost entirely a Prussian river, runs through the whole extent of the monarchy, from the S. frontier of Silesia to the isle of Usedom, where it falls into the Baltic. Polish Prussia (or Posen) is watered by the Wartha; West Prussia by the Vistula; and Ducal, or East Prussia by the Pregel and Niemen. Besides the above, there are many other large streams, as the Ems, Moselle, Spree, Havel, Netze, etc. Owing to the flatness of the country through which they flow, none of the great rivers are interrupted by cataracts, and they are all navigable—the Rhine, Elbe, and Vistula, throughout their whole course in the Prussian dominions; the Oder for barges as far as Ratibor in southern

Silesia, and the Pregel and Niemen to a considerable distance inland. Lakes are exceedingly numerous, particularly in East Prussia and Pomerania. There are also along the coast several large bays, or rather lagoons, communicating with the sea by narrow mouths, and possessing more of the character of fresh-water lakes than of arms of the sea. They are denominated *haffs*. The climate of Prussia is not less varied than the soil. Along the Baltic it is moist, and in East Prussia, especially, the winter is long and severe. It is also harsh in the S. part of Silesia, Brandenburg, and in the Saxon and Rhenish provinces it is comparatively mild. The quality of the soil is various. In Brandenburg and Pomerania it is generally poor; in many parts, indeed, it consists of tracts of loose barren sand, diversified with extensive heaths and moors; but, in other parts, particularly along the rivers and lakes, there is a good deal of meadow, marsh, and other comparatively rich land. In Ducal Prussia and Prussian Poland, including the province of Posen, the soil consists generally of black earth and sand, and is, in many parts, very superior; but Silesia, and the Saxon and Rhenish provinces, are naturally, perhaps, the most productive. The plain of Magdeburg, on the left bank of the Elbe, is also very fertile.

Agriculture and Stock Raising.—Large estates are generally managed by stewards and the occupants of smaller properties are, in most cases, the owners. Rye, wheat, barley, oats, potatoes, beet root, flax, hops, tobacco and hemp form the chief products. Chicory is also largely cultivated. The extensive beet root plantations give rise to one of the most important industries. Madder and other plants used in dyeing are also raised. Fruits and vegetables are most extensively grown in the W. provinces, which are also famous for their wines. Horses, cattle and sheep are extensively raised, wool being an important product. Large numbers of fine horses are exported from East Prussia.

Mining.—The mineral products are abundant, coal being the most important. The production of lignite is large. Copper, iron and lead are extensively worked. Prussia yields about one-half of the world's annual production of zinc.

Manufacturing.—Though more of an agricultural than a manufacturing country, Prussia has greatly distinguished herself, particularly of recent years, in various branches of manufacture. The Rhenish provinces, and Saxony and Silesia, are the districts most prominent in this industry. Linens and coarse woolens for domestic consumption are made in every village, and, indeed, in most cottages throughout the kingdom. Large quantities of silk and cotton goods, and linen, are produced in Elberfeld, and other towns of the Rhine provinces. Very superior broadcloth is largely manufactured at Berlin and Aix-la-Chapelle. Prussia occupies an advanced rank as a producer of the useful metals. The articles of hardware made at Berlin, Iserlohn, Hagen, Solingen, Olpe, and Essen enjoy a high reputation, the last-named place being the seat of the famous Krupp steel and gun works. Porcelain, jewelry, watches, and carriages are also manufactured in the latter city on a most extensive scale. Paper, leather, soap, oil and cigars are important manufactures; and beer and spirits are very extensively produced.

Commerce.—Commerce is facilitated by the long coast line, and by an elaborate system of railways and canals. In 1919, the number of miles open for traffic was about 25,000. The Kiel Canal is of especial service and value in development of agriculture and of commerce, both foreign and domestic. There are chambers and corporations of commerce in all of the larger towns of the kingdom. There are no separate statistics for the trade of Prussia; they are included under those of the German empire.

Education.—Throughout the kingdom, education is general and compulsory for the elementary grades. The school age is from 6 to 14 years. In 1919 the institutions for secondary education were as follows: Universities, 11; classical and scientific high schools (gymnasia and realschulen), over 1,300; public normal schools, 204.

Religion.—Absolute religious liberty is guaranteed by the constitution. Nearly two-thirds of the population are Protestants and most of the remainder Roman Catholic. The State Church is Evangelical or Protestant, and since 1817 has consisted of a fusion of the Lutheran and Calvinistic bodies. The relations of the Roman Catholic Church to the government differ in the various provinces.

Government and Finances.—Previous to the World War the constitution vested the executive and part of the legislative authority in a king. The crown was hereditary in the male line, according to primogeniture. The king was advised by a council of ministers appointed by royal decree. The representative assembly, the Landtag, was composed of two chambers, the House of Lords (Herrenhaus) and the Chamber of Deputies (Abgeordnetenhaus). The assent of the king and both chambers was requisite for all laws. The executive government was carried on by a Ministry of State ap-

pointed by the king and holding office at his pleasure. Prussia was proclaimed a republic on Nov. 13, 1918. A new constitution was adopted in April, 1920. Under it every citizen over 20 years of age became a voter, the term of parliament was set at 4 years, and the powers of the former king were transferred to the ministry. In 1919 the revenue and expenditures were each estimated at 6,546,699,278 marks. The public debt on April 1, 1919, was 14,724,436,874 marks.

History.—The rise of the Prussian power has been rapid and extraordinary. The kings of Prussia trace their origin to Count Thassilo of Zollern, one of the generals of Charlemagne. His successor, Count Friederich I., built the family castle of Hohenzollern, near the Danube, in the year 980. A subsequent Zollern, or Hohenzollern, Friederich III., was elevated to the rank of a prince of the Holy Roman empire, in 1273, and received the burgraviate of Nuremberg in fief; and his great-grandson, Friederich VI. was invested by the Emperor Sigismund, in 1411, with the province of Brandenburg, and obtained the rank of Elector in 1417. In 1608–1619 the duchy of Prussia was united to the electorate of Brandenburg, the territories of which had been greatly extended by the valor and wisdom of Friederich Wilhelm, "the Great Elector," under whose fostering care arose the first standing army in central Europe. Dying in 1688, he left the province to his son, Frederick I., who assumed the crown at Königsberg, Jan. 18, 1701. Pomerania was soon after added to Prussia. When FREDERICK THE GREAT (*q. v.*) ascended the throne in 1740, his disjointed dominions did not contain 2,500,000 inhabitants, and these had made but little progress in the arts, or in the accumulation of wealth. But before his death, in 1786, Prussia had been increased in size nearly half; while the population had increased to about 6,000,000. Prussia acquired, by the subsequent partition of Poland in 1792, and its final dismemberment in 1795, a great extension of territory, and upward of 2,000,000 inhabitants. Her disastrous contest with France in 1806 lowered Prussia for a while; but after Napoleon's Russian campaign, the people rose en masse, and drove the French out of Germany. At the general peace of 1815, Prussia recovered all her former possessions (except a portion of her Polish dominions), and gained valuable acquisitions. After the accession, in 1862, of King William I., the executive government presided over by COUNT VON BISMARCK (*q. v.*), made laws, and even decreed budget estimates, without the concurrence of the chambers. In 1864, Prussia, conjointly with Austria, sent an army to occupy the duchy of Schleswig-Holstein. A war with Denmark followed, which resulted in the annexation of that duchy to Prussia. In 1866, Hanover and Saxony were occupied by the Prussian troops, and a war followed with those kingdoms and with Austria, in which, after a brilliant campaign of two weeks, the latter power was obliged to sue for peace, and relinquish her claims as a German power. In addition, Saxony was left a mere nominal sovereignty under the control of Prussia, while Hanover, Hesse-Cassel, Nassau, and the former free city of Frankfort-on-the-Main became absorbed in the Prussian monarchy. In August, 1870, Napoleon III. declared war against Prussia, and the French armies marched toward the Rhine. An alliance having been entered into between Prussia and the southern German powers of Bavaria, Württemberg, and Baden, their combined forces crossed the Rhine into France. The part of Prussia in the Franco-Prussian war is inextricably involved with that of the whole German nation. The conflict seemed to precipitate the solution of the question which had always been the aim of the king and Bismarck, German unity under Prussian leadership. On Jan. 18, 1871, King William was crowned at Versailles as Emperor of Germany, and on March 21, the first German Reichstag assembled at Berlin. The history of Prussia since is that of Germany (*q. v.*).

KINGS OF PRUSSIA.
(House of Hohenzollern.)

Frederick I.	Date of accession		1701
Frederick William I.	"	"	1713
Frederick II. ("The Great")	"	"	1740
Frederick William II.	"	"	1786
Frederick William III.	"	"	1797
Frederick William IV.	"	"	1840

William I., 1861; Frederick III., 1888; William II. 1888.

PRUSSIAN BLUE, a cyanide of iron (Fe_7Cy_{18}) possessed of a deep-blue color, and much used as a pigment. It is also used in medicine.

PRUSSIAN BROWN, a color obtained by adding a solution of the yellow prussiate of potash to a solution of sulphate of copper, which throws down a precipitate of deep brown. This, when washed and dried, is equal to madder, and possesses greater permanency.

PRUSSIC ACID, a name given to hydrocyanic acid because it was first obtained from Prussian blue.

PRUTH, a left-hand affluent of the Danube, rising in the S. E. of Austrian Galicia, on the N. E. side of the Carpathian Mountains, and flowing E. past

Kolomea and Czernowitz; from the point at which it leaves Austrian territory to its embouchure in the Danube at Reni, 13 miles below Galatz, it forms the boundary between Russian Bessarabia and Rumania. Length about 520 miles, navigable from near Jassy, 168 miles. It was the scene of many military operations between the Russian and Austro-German armies in the World War (1914-1918).

PRZASNYSZ, a town in Russia, 59 miles N. E. of Plock, with a population, in 1900, of 9,245, of importance only on account of the heavy fighting which took place between the Russian and Teutonic forces during 1915 and later. The town was taken by the Germans in February, 1915, retaken by the Russians a few weeks later, in March, and again captured by the Germans, in July, 1915. These conflicts, constituting a series of battles of the first magnitude, have accordingly taken their name from the town, and are known as the Battles of Przasnysz.

PRZEMYSL, a fortified city of the former Austrian crownland of Galicia, now Poland, on the river San, 54 miles W. of Lemberg, important as a railroad center and on account of its trade in flour, naphtha, chemicals, wood, grain, leather, and linen, with a population in 1910 of 54,869. The name of the city became familiar through its prominence in the dispatches during the early period of the war on the eastern front, 1914-1916. In the fall of 1914 the Russians drove the Austrians along the Galician front back into the Carpathians, leaving the Austrian forces in the city besieged by the Russian forces. In October, 1914, the Russians were obliged to retire temporarily, leaving the investment broken for some three weeks, and during this period more troops, provisions and war materials were rushed into the garrison. With the return of the Russians the siege was continued, lasting until March 22, 1915, when the city formally surrendered to the Russian commander, causing one of the sensations of that period of the war. The prisoners taken included 9 generals, 93 superior officers, 2,500 minor commissioned officers, and 170,000 rank and file. The city was retaken by the Austrians in June, 1916.

PSALMIST, a writer or composer of psalms; a title applied especially to the authors of the Scriptural psalms, and specifically, with the definite article prefixed, to David. Psalmists, in Church history, were singers in the early church whose duty it was to lead the people. The Roman Catholic Church still retains this order as the leaders of music.

PSALMODY, the art and practice of singing psalms. The composition of psalm tunes and the performance of psalmody appears to have been practiced and encouraged in Germany, France, and the Low Countries before it was introduced into Great Britain. In France psalmody was popularized at the Reformation by Clement Marot and Claude Goudimel, the former of whom translated the Psalms of David in verse, while the latter set them to music. Psalm singing was introduced by the Reformers; but Calvin discouraged any but simple melody, while Luther practiced and favored part harmony, as did also John Knox in his psalter. The first English version of the Psalms of David, which appeared soon after that of the French, was made in the reign of Henry VIII., by Thomas Sternhold, groom of the robes to that monarch, and John Hopkins, a schoolmaster, assisted by William Whittyngham, an English divine. It was afterward superseded by the version of Nahum Tate, the poet laureate, and Dr. Nicholas Brady. The first important compilation of psalm tunes for four voices was published in 1621 by Thomas Ravenscroft, and included such well-known tunes as Bangor, St. David's Norwich, York, etc. Sternhold and Hopkins' version of the Psalms was first used in Scotland, and was afterward superseded by the version now in use, founded on that of Francis Rous, provost of Eton, a member of Cromwell's government.

PSALMS, BOOK OF, a book of the Old Testament. It was the praise book or psalter of the Hebrew temple or synagogues. In the present Hebrew Bibles it is usually placed just after the Prophets at the head of the Hagiographa, and in Luke xxiv: 44, is generally supposed to stand for that division of the Old Testament books. The 150 psalms are arranged in Hebrew in five books, each terminating with a doxology, in some cases closing with "Amen and amen." The revised version prints them separately. All but 34 psalms have titles in the Hebrew Bible; the latter were called by the rabbis orphan psalms. In the Septuagint all but two have titles. Though not as a rule accepted as part of Scripture, they are ancient, and worthy of high respect. They attribute all book 1 to David, except Ps. i., ii., x., and xxxiii. The name of the Supreme Being used in this book is chiefly Jehovah. Book 2 assigns Psalms to David, to Korah, to Asaph, and to Solomon, and leaves others anonymous. The

name for the Supreme Being in this book is ELOHIM (*q. v.*). Book 3 ascribes Psalms to David, to Korah, to Asaph, to Ethan, and to Heman the Ezrahite. Elohim and Jehovah are about equally common in the book, the former, however, being apparently preferred. Book 4 ascribes Psalm xc. to Moses, the others not anonymous to David. Book 5 leaves many psalms anonymous, attributing others to David. The Hebrew Bible, but not the Septuagint, assigns Ps. cxxvii. to Solomon. This volume contains the Songs of Degrees. The book was evidently brought together from many sources. The book of Psalms is quoted or alluded to as an inspired composition by Our Saviour and His apostles at least 70 times; no Old Testament book is more frequently quoted. Its canonical authority has never been seriously doubted. It has become the psalter of the Christian Church.

PSALTER, the Book of Psalms; also a book containing the Psalms separately printed, and with musical accompaniment adapted to each; also specifically, the version of the Psalms in the English Book of Common Prayer. In the Roman ritual, the daily office in the Breviary. Our Lady's Psalter is the Little Office.

PSALTERY, a stringed instrument of music used by the ancient Jews, the form of which is not known. That which is now used is in the form of a trapezium or triangle truncated at the top, having 13 strings of wire, mounted on two bridges at the sides, and is struck with a plectrum.

PSAMMETICHUS, a king of Egypt who died about 617 B. C. He was one of the 12 kings who reigned simultaneously in Egypt for 15 years after the expulsion of the Æthiopian dynasty; but being suspected by the other kings of aiming at sole sovereignty, he was driven into banishment. With the aid of some Greek mercenaries, however, he defeated the other kings in a battle fought at Momemphis, on the E. side of Lake Mareotis, after which he became the sole King of Egypt (671 or 670 B. C.), and the founder of a new dynasty.

PSARA, or **IPSARA**, an island of Greece, in the Grecian Archipelago, 7 miles N. W. of Scio, about 5½ miles in length, and as many in breadth.

PSEUDOMORPH, a mineral which has replaced another, or which appears in crystal forms which are foreign to its original formation.

PSEUDONYM, a false, feigned, or fictitious name; a pen-name.

PSEUDOPODIA, organs of locomotion and prehension in the lower Protozoa.

PSEUDOSCOPE, in optics, an instrument, invented by Wheatstone, for producing an apparent reversion of the relief of an object to which it is directed, by the transposition of the distances of the points which compose it. A false impression is thus conveyed to the eye, a globe becoming apparently concave and a hollow body assuming a convex form.

PSITTACIDÆ, the parrot tribe, a family of scansorial birds, comprising over 300 species, of which the genus *Psittacus* is the type.

PSKOV, a city in Russia, on the right bank of the Velikaya, 165 miles S. S. W. from Petrograd. It is the center of a considerable trade in flax, hemp, hides, tallow and contains a large number of small leather goods factories. For nearly 300 years, during the Middle Ages, it was a free republic, but became subject to Moscow in 1509. During the World War, it was the center of much activity behind the lines, and after the disastrous Brest-Litovsk Peace Conference, in the winter of 1917-1918, was invaded by the Germans. Pop., in 1920, estimated at 30,300.

PSOAS, in anatomy, two muscles; the *psoas magnus* and *psoas parvus*, connected with the lumbar vertebræ. In entomology, a genus of beetles allied to Bostrichus.

PSORALEA, in botany, the typical genus of *Psoralieæ*. *P. coryfolia* is considered by Indian doctors to be stomachic and deobstruent. An extract from it, prepared with oil or ointment, is used externally in leprosy. Camels are fond of *P. plicata*.

PSORIASIS, a cutaneous disease—the scaly tetter. It is often hereditary, and is akin to lepra.

PSYCHE. In the later Greek writings the word *psyche* occurs as a personification of the human soul.

PSYCHICAL RESEARCH, a term applied to the process of inquiry into the "phenomena designated by such terms as mesmeric, psychical, and spiritualistic," to use the words of the programme of the British Society for Psychical Research. The object of the inquiry, as described by this society, was to determine the nature and extent of any influence which might be exerted by one mind upon another apart from any generally recognized mode of perception. Inquiry had to be made into hypnotism, the so-called mesmeric trance, clairvoy-

ance, reports of apparitions and haunted houses, and the phenomena of spiritualism. The British society was established in 1882, and an American society on similar lines two years later. Since that time continued inquiry has been made for the purpose of testing all the reported channels of thought that might exist outside the known channels of perception. The methods employed include arrangements by which an agreed-upon individual is led to concentrate his mind on some simple idea or object and to seek by methods distinct from those employed by the senses to transfer the idea to a second individual, who is usually chosen as being endowed with a supposed acute sensibility to impressions so received. The evidence gathered is designed to show that impressions of various kinds have been communicated from one mind to another in this way. On occasions the person acting the part of recipient has been put into a hypnotic condition, and experiments have been considered as showing that acute sensibility so induced has made thought transference more easy. The evidence that has been accumulated up to the present as a result of experiment has, however, not been such as to establish any process of telepathy.

Apart from the evidence that has been derived from repeated experimental attempts at thought transference, the societies of psychical research have systematically gathered all available data relating to human experience in the telepathic field. This group of experiences has been in the main of a spontaneous character, arising without any preparation of milieu or conditions on the part of the percipient. The larger division relates to the transference of presentiments in connection with crises in the lives of persons involved in the presentiment. Only a small proportion of the cases so recorded, however, were bereft of elements that tended to doubt as to the actual connection between the event and the presentiment. The investigation, however, showed how subject the human mind is to ideas of this kind, even in a state normal and healthy. The sum total of inquiry up to the present time has not established the telepathic hypothesis on a scientific basis, but it has at least explored mental conditions that before the introduction of psychical research had remained unexplored, and if it has not shown with certainty telepathic potentialities in the human mind, it has at least aided in defining more clearly human limits in the perception and communication of ideas.

The American Society for Psychical Research was for some years connected with the British society, but in 1906 it was reorganized into an independent association. The society issues a monthly journal, and has for some years published its proceedings. It participated in the census of hallucinations, initiated by the British society and carried on for three years ending in 1892. The society does not aim at the classification of a recognized body of knowledge, but at an investigation and interpretation of groups of psychical phenomena.

PSYCHICAL RESEARCH, SOCIETY FOR, an English society, founded in 1882, "for the purpose of making an organized attempt to investigate that large group of debatable phenomena designated by such terms as mesmeric, psychical, and spiritualistic." The results of its investigations are published in "Reports" and "Proceedings." There is a branch of the society in the United States.

PSYCHOANALYSIS, a form of therapeutic treatment originated by Professor Freud of Vienna. In its essence it is a system of psychological inquiry into the subconscious psychic forces at the base of psychic disturbances, preliminary to the formulation of a method of treatment in cases of neurasthenia, hysteria and the like. The principle lying at the foundation of his theory is that these psychical manifestations spring from emotional experiences that have been forgotten or repressed into the field of unconsciousness, while still holding their place in the mind.

Professor Freud's method of treatment seeks to establish the connection between the neurotic manifestations of the patient and the causes that lie hidden in his memory. Its purpose is to pierce the obscurity in which these latent ideas are embedded and by revealing the connection between them and their symptoms to bring about their disappearance. In this connection he developed his theory on the nature of dreams, which in his view were merely distortions of unrealized desires. In the treatment the patient is led to repeat what he remembers of his dreams and to reveal the flowing course of his aspirations and thoughts. On the basis of the knowledge so acquired the physician shows the connection between cause and effect to the patient and dissipates the neurotic condition by rationalizing it.

There is unquestionably much that is sound in Psychoanalysis, but both the inquiry and the treatment call for great sagacity, skill, and patience, and these qualities are not always present in those who endeavor to apply its principles. In the United States the theory has received further development and is being

used with success in the milder forms of nervous affections.

PSYCHOLOGY, the science of mental phenomena. Opinion is far from unanimous on many of the most important points of psychological doctrine, especially on such points as involve a philosophical view of the nature of mind.

Thus, in the first place, we have the view that psychology deals with the facts of the conscious mind which, when knowing, feeling, or striving, is always conscious of itself as knowing, feeling, or striving—*i. e.*, is self-conscious. But it has many difficulties. We can hardly ascribe self-consciousness to the lower animals or to very young children, and yet some kind of mental life clearly belongs to them; so that it would seem that mental life and self-consciousness cannot be identified. Further, many psychologists (including Hamilton) are of opinion that there are mental phenomena unaccompanied by self-consciousness even in mature human life.

In the second place, a materialistic view of mind is connected with the attempt to make brain physiology play the part of a psychology. It is plain, however, that a sensation or a feeling of pleasure or pain is a fact of an entirely different order from a neural disturbance. The one may accompany or even cause the other (or both may be only different aspects of the same ultimate existence), but the characteristic nature of the mental fact is not reached by the most thorough investigation of its physiological conditions, while the latter are in many cases much more obscure than the phenomena they are adduced to explain.

In the third place, an attempt has been made (sometimes apart from any philosophical hypothesis as to the nature of mind) to start with certain mental facts —called presentations, sensations, or feelings—regarded as ultimate or independent, and to trace the laws and manner of their combination and succession. This method has been worked with excellent result by the English Associationist psychologists. By a similar method, and by treating presentations as forces, Herbart and his followers have elaborated a mechanism of the mind and reduced psychology to mathematical form. The difficulty of this mode of conceiving mind is to explain how a series of sensations —on any interaction of presentations— can generate the consciousness of a self persisting through changing states; and even to give any meaning to sensation or presentation without regarding it as experienced by or presented to mind. On these grounds many psychologists, while influenced by the scientific method of the Associationists and of Herbart, hold that presentation or sensation is only conceivable as belonging to a subject or mind. So far, mind must be assumed by the psychologist as implied in the experience of which he has to trace the development. This subject, or mind as the condition of experience, may be admitted to elude psychological observation.

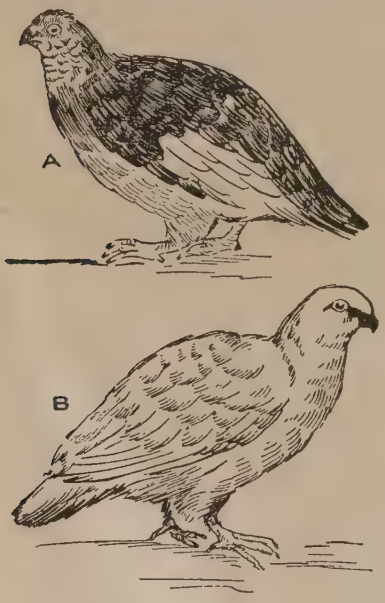
Consult "Psychological Principles" Ward (1918); "Psychology of Peoples" Le Bon (1898); "The Mind and Its Education" Betts (1916); "Educational Psychology" (1913-1914).

PSYCHOTHERAPY, treatment of disease by the application of mental influence. The treatment takes various forms and the conditions of its efficacy depend on the psychical character of the disease and the responsiveness of the symptoms to psychical remedies. Since, however, there is hardly a malady that has not its psychical factors psychotherapy can often supplement the work of ordinary treatment even in cases where it cannot effect a cure. It is estimated that nearly half the number of known diseases have a psychical origin, though, on the other hand, every illness has its physical basis also. The mental influence has to be of a character to fit the case. In the case of children the remedy is of the simplest and a mere prohibition or command or word of flattery and encouragement may have its due effect. There is no limit to the tricks and artifices that may be used from harshness to sympathy, from bullying to wheedling, from playing on prepossessions and personal weaknesses to philosophical argument: all have their place in dealing with the nervously afflicted. The skill of the practitioner will be shown in his capacity for trained observation of the connection between cause and for applying his suggestive influences accordingly.

Psychotherapeutic treatment in practice falls into a number of divisions, of which the most important fall under the heads of hypnosis, suggestion, re-education, and psychoanalysis. These methods of treatment interlap more or less. Hypnosis, as here used, is based largely on the influence of suggestion, seeking means of fixing certain ameliorative ideas in the patient's mind, while his will and consciousness are held in restraint by conditions such as hypnotic sleep. Under the heading of suggestions are included methods of inducing desirable emotional conditions by influences beyond the cognizance of the patient. Re-education has as its purpose the mental reconstruction of the patient by clarifying his mind and showing him what he is capable of performing and

what he is not. PSYCHOANALYSIS (*q. v.*), is an extended form of his re-education, and involves the moral rehabilitation of the patient by leading him through free association to bring his whole mind into the open, however reluctant he may be in doing so, and thus reveal the repressed desires, of which, according to the theory of Freud, the neurotic manifestations are the outward symbols and expressions.

PTARMIGAN, *Lagopus mutus*, a game bird found in the N. of Europe, especially in Norway and Sweden, and in the United States. In winter the plumage of the male is almost wholly white, with a small patch behind the eye;



ROCK PTARMIGAN
A. Summer Plumage
B. Winter Plumage

the shafts of the primaries and the bases of the exterior tail-feathers are black, and there is a patch of bare red skin around the eye. In the summer the black retains its position, but the white is mottled and barred with black and gray. The length of the adult male is rather more than 15 inches. Their call is a harsh croak.

PTERASPIS, a genus of *Placodermi*, having the cephalic shield finely grooved and composed of seven pieces. It had a rostrum in front, and its lateral angles were produced so as to form short cornua. So far as is known, it is the most ancient fish form, two species being known from the Upper Silurian, and six from the Lower Devonian of Orkney and Perthshire, Scotland.

PTERICHTHYS, a genus of Placoderms, discovered by Hugh Miller in the Old Red Sandstone. The head and anterior part of the trunk were defended by a buckler of large ganoid scales, united by sutures, the cuirass articulating at the sides with a back plate; the rest of the body covered with small ganoid scales. Pectorals long and wing-like, a scaly short tail. Twelve species; eight from the lower, and four from the Upper Devonian of Orkney, Cromarty, Caithness, Scotland, and in Ireland.

PTERIS, in botany, a genus of *Polypodeæ*. Sori continuous, linear, marginal; involucre scarious or membranous, confluent with the recurved margin of the frond. Known species 80, of world-wide distribution.

PTEROCARPUS, in botany, a genus of *Dalbergieæ*, having a thin wing at the edge of the fruit. Large trees, chiefly from the tropics. *P. marsupium*, *P. indicus*, and *P. macrocarpus* furnish East Indian kino, and *P. erinaceus*, African kino, *P. draco* and *P. santalinus*, red sandal wood. *P. balberggioides*, a good Indian wood, and *P. indicus*, the excellent Andaman red wood. Cattle and goats feed on the leaves of *P. marsupium*.

PTEROCERAS, in zoölogy, scorpion shell, or spider shell. Shell, when young, like that of Strombus; afterward the outer lip becomes prolonged into several long claws, one of them forming a posterior canal. Recent species 12, from India or China.

PTERODACTYL, a remarkable genus of fossil lizards, peculiar to the Mesozoic strata. Collini, and other more eminent naturalists, referred it to the mammalia, finding its nearest ally in the bat. The careful investigations of Cuvier, however, showed that the pterodactyl was a true lizard, but possessed of the power of flight.

PTEROPODA, in zoölogy, a class of Cuvier's *embranchement* of sub-kingdom Mollusca. Also, a sub-class of Cephalopoda, in which the mid-region of the foot is drawn out into a pair of wing-like muscular lobes, used as paddles. The hind region is often absorbed, but may carry an operculum; the fore region is sometimes drawn out into tentacles, provided with suckers. There are two orders: *Thecosomata* and *Gymnosomata*.

PTEROSAURIA, an order of flying Reptilia of Mesozoic age. No exoskele-

ton; dorsal vertebræ procœlous, anterior trunk-ribs double-headed; broad sternum, with median keel, and ossified sternal ribs. Jaws generally armed with teeth, implanted in distinct sockets. The fore-limb consists of a humerus, ulna, and radius, carpus, and hand of four fingers, the inner three unguiculate, the outer clawless and enormously elongated. Supported by this finger, the

PTERODACTYLS

side of the body, and the comparatively short hind limb, was a patagium, or flying membrane. The bones were pneumatic.

PTOLEMÆUS, the dynastic name of 13 kings of Egypt, who reigned from 323 to 43 B. C. The most famous was Ptolemæus Soter, who reigned from 323 to 285 B. C. See PTOLEMY I.

PTOLEMAIC SYSTEM, the hypothesis maintained by Ptolemy in his "Almagest" that the earth was a fixed body, remaining constantly at rest in the center of the universe, with the sun and moon revolving round it as attendant satellites. To account for the more complicated movements of the planets, a contrivance was devised by which each planet revolved in a circle, while the center of that circle described another circle round the earth. The Ptolemaic system prevailed till Copernicus propounded what is now accepted as the true system of the universe. See COPERNICUS; PTOLEMY, CLAUDIUS.

PTOLEMY, the name of various ancient rulers, as follows:

PTOLEMY I., surnamed Soter, founder of the Græco-Egyptian dynasty of the Lagides, was a Macedonian, and became a favorite general of Alexander the Great. On the death of his master, in

323 B. C., Ptolemy I. obtained Egypt for his province. For 20 years he was almost constantly engaged in war. He defeated his rival Perdiccas, acquired Phœnicia and Cœlo-Syria; joined the league against Antigonus; was defeated by Demetrius in 306, and lost the island of Cyprus, and soon after took the title of king. He saved Rhodes when besieged by Demetrius, and received the title of Soter (savior); and after the fall of Antigonus he applied himself to the promotion of commerce, literature, science, and the arts in his own dominions. Philosophers, poets, and painters gathered to his court, and the foundations were laid of the famous Alexandrian Library and Museum. In 285 Ptolemy resigned his crown to his son, surnamed Philadelphus, and died in 283.

PTOLEMY II., surnamed Philadelphus (lover of his brother), born in Cos, 311 B. C., was the youngest son of the preceding by his favorite wife, Berenice. He became king on the abdication of his father in 285. He completed the Alexandrian Library Museum, patronizing learning and learned men, founding colonies, and increasing his army and his revenue. He made a treaty of alliance with the Romans, and encouraged the resort of Jews to Egypt. He died in 247.

PTOLEMY III., surnamed Euergetes (benefactor); was early engaged in an important war against Syria, which having invaded he advanced without opposition to Antioch, then turned E., subduing Mesopotamia, Babylonia, etc. The fleets of Ptolemy had at the same time subdued the coasts of Asia Minor, and carried his arms to the Hellespont and to the coast of Thrace. Ptolemy took some part in the affairs of Greece against the rulers of Macedonia, and maintained friendly relations with Rome. He died in 222 B. C.

PTOLEMY IV., surnamed Philopator, succeeded Ptolemy III. His Syrian possessions having been gradually wrested from him by Antiochus the Great, Ptolemy put himself at the head of a large army and completely defeated Antiochus at Raphia, in 217 B. C. He later gave himself up completely to debauchery, and died 205 B. C.

PTOLEMY V., surnamed Epiphanes, son of Ptolemy Philopator, and great-grandson of Philadelphus, was born 210 B. C., and at 5 years of age succeeded his father. The aid of the Romans was obtained against the kings of Macedonia and Syria, who threatened to dismember his dominions. The young king was declared of age at 14, and crowned at Memphis; and three years later he married Cleopatra, daughter of Antiochus of Syria. He had an able and upright minister in Aristomenes, but, notwithstanding his great service, had him put to death. Most of the foreign possessions were lost to Egypt during this reign. Ptolemy was poisoned in 181 B. C.

PTOLEMY VI., surnamed Philometer, son of the preceding, succeeded his father 181 B. C., under the regency at first of his mother, Cleopatra, and then of feeble and corrupt ministers, who involved the kingdom in a disastrous war. Egypt was invaded, and the young king taken prisoner by Antiochus Epiphanes; a younger Ptolemy was set up as king, and the two brothers tried to reign jointly, supported by the Romans; but they quarreled, and Philometer was driven away. He was restored by the Romans, and his brother (Euergetes II., or Physcon) was made king of Cyrene. Philometer was killed in a battle near Antioch, 146 B. C.

PTOLEMY XI., surnamed Auletes (flute-player), was driven from his kingdom by his subjects, who were ground down by taxation; but he was restored by the Romans, and died in 51 B. C.

PTOLEMY XII., Dionysius, son of Ptolemy Auletes, succeeded to the throne conjointly with his sister Cleopatra, under the protection of Pompey, in 51. He became a partisan of Cæsar in the Civil War, and after the battle of Pharsalia caused Pompey to be assassinated. Aspiring to be sole king, he then took arms against Cæsar, who had decided that Cleopatra should continue to reign with him, and was drowned in the Nile while flying from the field of battle, 47 B. C.

PTOLEMY XIII., younger brother of the preceding, was 11 years of age when Cleopatra was left sole mistress of Egypt by his death. She was compelled to marry him by Cæsar, and he reigned with her till his death in 44 or 43 B. C.

PTOLEMY XIV., Cæsarion, an illegitimate son of Cæsar and Cleopatra, and the last of the Lagides, obtained the title of king from the Roman triumvirs, 42 B. C. He was killed by order of Augustus at the age of 18, 30 B. C.

PTOLEMY, CLAUDIUS, a celebrated astronomer and geographer, who flourished at Alexandria, about A. D. 140–160. He is considered the first astronomer of antiquity. He corrected Hipparchus' catalogue of the fixed stars, and formed tables by which the motions of the sun, moon and planets might be calculated and regulated. He was the first who collected the scattered and detached observations made by the ancients, and digested them into a system; this he called the "Great Construction." (See

PTOLEMAIC SYSTEM.) The "Great Construction" was translated by the Arabians into their language about 827, and from this translation, which bears the title of "Almagest," a Latin version, was made by command of the Emperor Frederick II., in 1230.

PTOMAINE, a putrescent product of animal origin and of a basic or alkaloidal nature, closely allied to the vegetable alkaloids; a cadaveric poison. About 150 varieties of ptomaines are known, some being harmless, others very poisonous. Ordinary foods frequently undergo changes that render them harmful, and especially is this so with mussels, clams, oysters, fish, meat, sausage, milk, ice-cream, cheese and canned goods. These changes are due to the presence of ptomaines. Heat will destroy the ptomaine bacteria, but their poison is not eliminated by cooking. See BACTERIA.

PTOSIS, in pathology, a falling; as *Ptosis palpebræ*, a paralysis of the muscle which should keep the upper eyelid from falling.

PUBERTY, the age at which persons are capable of begetting or bearing children; the period marked by the functional development of the generative system in both male and female, and their corresponding aptitude for procreation. In botany, the period at which a plant first begins to bear flowers.

PUBILIUS VOLERO, the author of the Pubilian law at Rome; a law by which the power of the plebs or people was greatly increased.

PUBLICAN, in Roman antiquities, a collector of revenues, or farmer of the taxes consisting of tolls, tithes, harbor duties, duties for the use of pasture lands, mines, salt works, etc., in Roman provinces. Also, formerly a collector of toll, tribute, customs, or the like.

PUBLIC HEALTH SERVICE, a bureau of the United States Treasury Department, formerly going under the name of the Marine Hospital Service. The officials in its service have the work of managing the marine hospitals and relief stations established for men in the American merchant marine who are ill or disabled. It is also charged with the supervision of the quarantine stations, and the collection of data and dissemination of literature relating to mortality and health, including the examination of persons from abroad who may be suffering from infectious diseases. The Public Health Service dates from the year 1798, and its duties have developed considerably from that time. At first it was charged with the supervision of a small group of hospitals. Then in 1871 the bureau was brought more in touch with the Treasury Department and was established on a broader basis under a surgeon-general with headquarters in Washington. The staff was gradually increased till the number of surgeons has totaled over 400, and hospitals have been established both on the Atlantic and Pacific coasts, on the coasts of the Great Lakes, the Gulf of Mexico, and in other places in the more recent possessions. In 1914 the hospitals numbered 24, and the relief stations 120. In the year previous the bureau distributed close on 1,500,000 pamphlets and similar pieces of literature dealing with matters of health.

PUBLICIST, a term originally applied to a writer on international law, now used to denote a writer on current politics.

PUBLIC PROSECUTOR, an officer appointed to originate and conduct prosecutions in the public interest. In the United States his title is usually district attorney, though in some states special prosecutors are assigned to minor courts.

PUBLIC UTILITIES, REGULATION OF, in which the government, national, state or municipal, on behalf of the public, asserts its right to interfere in the management of certain corporations for the protection of the public interest. It was, at one time, a generally accepted theory that the right of private individuals and corporations to manage their own business was sacred. Governments, however, are more and more regulating private business in the social interest. The right of the government to regulate the control of public utilities is no longer questioned, even by the most conservative. Public utilities are those enterprises which, though privately owned and controlled, have as their object the rendering of service to the general public, chief of which are railways, lighting plants, telephone and telegraph lines, water supply, etc. Foremost among these are such enterprises as street railways, waterworks, gas companies, etc., which exercise what is practically a monopoly in their own domain. Obviously, in granting such rights of monopoly, the public must reserve the right of regulation.

Regulation was at first attempted through legislation, but this method proved not only too slow, but inadaptable to special conditions which might arise. Regulation is, therefore, almost always carried on by commissioners, or commissions, which exercise the right of interference as the conditions may arise. The first official body of this sort created

in the United States was the Gas and Electric Light Commission, of Massachusetts, in 1885. Then came the Federal Interstate Commerce Commission, appointed in 1887, with the power to enforce the laws passed by Congress regulating trade between the various States. This body has gradually been given more and more jurisdiction, with the growing sentiment in favor of regulation. Having found her gas and electric light commission a success, Massachusetts later created a Railroad Commission, a Highways Commission, to regulate telephone and telegraph companies, and granted to the State Board of Health the authority to regulate the water supply companies. In 1907 Governor La Follette, in Wisconsin, was authorized by the legislature to appoint a railroad and a public service commission, and Governor Hughes, in the same year, appointed two public service commissions in New York. One of the New York commissions regulated all the public utilities in the city of New York, while the other's jurisdiction covered the rest of the State. In 1919 the commission for the city was abolished, and two created in its place; one to regulate public utilities in general, the other to regulate only rapid transit corporations, this latter commission being paid by the city, the former by the State. The work of these public service commissions, especially in the case of street railways, has become very difficult during the past few years, on account of the rising cost of labor and materials. On the one hand justice demands that fare increases be allowed, but on the other hand commissioners granting such rises are compelled to face the disapproval of the public.

PUBLIUS (more correctly **PUBLILIUS**) **SYRUS**, a Latin writer, so called because a native of Syria, was carried as a slave to Rome about the middle of the 1st century B. C. His master gave him a good education, and afterward set him free. He excelled in writing *mimi*, or farces, which were interspersed with moral sentences, and a collection of them was used by the Romans as a school book.

PUCCINI, GIACOMO, an Italian composer and musician; born at Lucca in 1858. He was trained in music at the conservatory of Milan. In 1884 appeared his first opera "Le Villi," but it was not until nine years later upon the appearance of "Manon Lescaut" that his genius received world-wide recognition. His best known operas include "La Bohême" (1896); "La Tosca" (1900); "Madame Butterfly" (1904), and "The Girl of the Golden West" (1910). The latter piece was written by Puccini especially for Americans, but it has had a doubtful success. In 1907 Puccini superintended the rehearsals and conducted the performance of his opera "Madame Butterfly" at the Metropolitan Opera House in New York. This opera is generally conceded his masterpiece, and Puccini is usually regarded as the successor of Verdi in the development of Italian opera.

GIACOMO PUCCINI

PUCCINIA, in botany, the typical genus of *Puccinæi*. The genus is parasitic and destructive to the plants on which it grows. *P. graminis*, the common mildew, causes the rust or blight in corn.

PUCK, in mediæval mythology, the "merry wanderer of the night," depicted in Shakespeare's "Midsummer Night's Dream." This fairy is known as Robin Goodfellow and Friar Rush in England, and in Germany as Knecht Ruprecht; but it is by his designation of Puck that he is most generally known in England, Germany, and the more northern nations.

PUD, or **POOD**, a Russian weight which contains 40 Russian pounds, equivalent to 36 pounds avoirdupois.

PUDDING BERRIES, the berries of the Canadian dogwood (*Cornus canadensis*), common throughout North America.

PUDDING STONE, a name given to certain siliceous conglomerates, notably that of Hertfordshire, England, in which the rounded, jaspery flint pebbles resemble the plums in a plum pudding.

PUDUKKOTTAI, a State of Madras, southern India, situated between the districts of Madura and Tanjore, mainly rocky and undulating plain, sparsely cultivated. Granite quarries, silk, cotton and perfume works represent the chief industries. Small export trade, chiefly groundnuts and bark of trees. Pop. about 450,000. Capital, Pudukkottai, pop. about 25,000.

PUEBLA, the third city of Mexico, capital of the State of the same name; (area, 12,992 square miles; pop. about 1,250,000); on a fruitful plain, 7,120 feet above sea-level, and 68 miles S. E. of the city of Mexico. It was founded in 1531, and is one of the handsomest towns in the republic. The city contains nearly 50 churches, theological, medical, art schools and a museum of antiquities dating from 1728. On the great square stands the cathedral, the interior of which is decorated in the most sumptuous manner with ornaments of gold and silver, paintings, statues, etc. Puebla has a thriving trade. The chief articles produced are cotton, paper, iron, glass, porcelain, leather. Puebla was besieged for two months by the French, and then taken by storm, May 17, 1863. Pop. about 100,000.

PUEBLO, a city and county-seat of Pueblo co., Col.; on the Arkansas river, and the Atchison, Topeka and Santa Fé, Missouri Pacific, Chicago, Rock Island and Pacific, and other railroads; 118 miles S. E. of Denver. Here are the State Hospitals for the Insane, the State Agricultural Society's buildings, etc. There is an extensive park system, excellent schools, public and private, libraries, county court house, State Mineral Palace and Park. The city has noted iron and steel plants and large stock-yards. Pop. (1910) 44,395; (1920) 42,908.

PUEBLOS (Spanish, *pueblo*, "village"), a semi-civilized family of American Indians in New Mexico and Arizona, dwelling in large single habitations, which are sometimes capacious enough to contain a whole tribe. In New Mexico there are 19 such villages, with over 8,000 occupants, who are skillful agriculturists, employing irrigation ditches extensively, and rearing horses, cattle, and sheep. Spinning and weaving and the manufacture of pottery also are carried on. The Moquis of Arizona are a related tribe, numbering about 1,800, in seven villages built on the summit of isolated hills. The Pueblos are under Roman Catholic missionaries, and are making steady progress in civilization and education. They were first visited by the Spaniards about 1530, at which period their habits and their habitations were very much the same as today.

PUERPERAL FEVER, the low fever of childbed, commencing with rigors and chills. There are three marked varieties: the simple inflammatory, the mild epidemic with nervous disturbance, and the putrid or malignant epidemic. It is highly infectious, and even contagious, sometimes associated with erysipelas.

PUERTO CABELLO, a seaport of Venezuela, in the State of Carabobo, 78 miles W. of Caracas. It stands on a long, low narrow peninsula on the Caribbean Sea, 34 miles from Valencia. There is an active foreign trade; the chief exports are coffee, cacao, indigo, cinchona, cotton, sugar, divi-divi, and copper ore. Pop. about 15,000.

PUERTO DE SANTA MARIA, a seaport of Spain, at the mouth of the Guadalete, on the bay of Cadiz, 22 miles N. E. of Cadiz. It is one of the principal export harbors for sherry, and manufactures silk, soap, hats, leather, spirits, beer, etc. Pop. about 20,000.

PUERTO PLATA, the chief port of the Dominican Republic, on the N. coast of the island of Haiti. It has an open roadstead, and exports a good deal of tobacco, mahogany, sugar, coffee, cocoa, divi-divi, etc. Pop. (1916) 10,000.

PUERTO PRINCIPE, an important inland town in the E. of the island of Cuba, 40 miles S. W. of its port, Nuevitas, with which it is connected by railway. It manufactures cigars. Now known as Camaguey. Pop. (1916) 30,000.

PUFENDORF, or PUFFENDORF, SAMUEL, BARON VON, a German writer on the law of nature and nations; born in 1632. He studied theology and law at Leipsic and Jena, and in 1660 appeared his "Elements of General Jurisprudence." In 1661 he became professor of the Law of Nature and of Nations at Heidelberg. In 1667 he published his work "The Commonwealth of Germany," which, from the boldness of its attacks on the constitution of the German Empire, caused a profound sensation. In 1670 he went to Sweden, became Professor of Natural Law in the University of Lund, and brought out his chief work, "Natural Law and the Law of Nations." Other famous works are "On the Spiritual Monarchy of the Pope" (a vindica-

tion of Protestantism); "History of Sweden," "History of Charles Gustavus," etc. Died 1694.

PUFF ADDER, the *Vipera* (*Clotho*) *arietans*, one of the most venomous serpents of South Africa. In length, when full grown, it is from four to five feet; is as thick as a man's arm, and, when disturbed, puffs out the upper part of its body, whence its popular name.

PUFF BALL, a fungus of the genus *Lycoperdon*. They mostly grow on the ground and are roundish, at first firm and fleshy, but afterward powdery within.

PUFFIN, the *Fratercula arctica*, a common English sea bird, with many popular names—bottlenose, coulterneb, pope, sea-parrot, and tammy norie, with others that are only locally known. It is rather larger than a pigeon; plumage glossy black above, under surface pure white; feet orange-red; bill very deep, and flattened laterally, parti-colored—red, yellow, and blue, and grooved during the breeding season. Puffins lay a single egg—white, with gray markings—in a burrow.

PUG DOG, a dwarf variety of the common dog, like a diminutive bull dog.

PUGET SOUND, an inlet of the Pacific Ocean, on the N. W. Washington coast, connecting the Strait of Juan de Fuca with Admiralty Inlet and the Hood Canal; in all an area of over 2,000 square miles and having 1,600 miles of shore line. The sound has many bays, islets, and inlets. Fishing, especially that of salmon, is carried on extensively. Clams and oysters are found in profusion. Shipbuilding is an important industry. Seattle and Tacoma are the most important ports situated on its shores.

PUGILISM, the practice of boxing or fighting with the fists. It formed one of the earliest of the athletic games of the Greeks; and we find the Greek poets describing their heroes and gods as excelling in the *pugne*. Boxing for men was introduced in the Olympic games in the 23d Olympiad, and for boys in the 37th Olympiad. With the exception of a girdle about the loins, the ancient pugilist fought nude. There was one feature, however, which bore no analogy to the pugilism of modern days; this consisted in the use of cæstus, a weapon formed of thongs or bands of raw ox-hide tied round the hands, and frequently as high as the elbows, of the boxers. Even in its simplest and most primitive forms, it was a fearful weapon enough; but when "improvements" crept in, in the shape of knobs of lead or iron, and, still later, when it assumed the form of a disk of bronze, it came to be a murderous piece of mechanism, fraught with despair and death to the less skillful fighter. As the head was exposed to great danger through the use of the cæstus, amphotides, or armor for the head, by which the temporal bones, arteries, and ears were protected, were invented; altogether, they were not unlike helmets.

Both ancient Greeks and Romans used the right arm chiefly in attacking, the left being reserved as a protection for the head and upper portions of the body. Like all the other athletic games of the Greeks, boxing was regulated by certain rules; the principal of these was that the pugilist was bound to continue to fight till wounds, fatigue, or despair compelled him to desist. It was not till the reign of George I. that pugilism came to be in a manner appropriated by the English. In the United States, as in England, the art has been brought down to the present day through a succession of pugilistic champions.

PUISNE, in law, younger or inferior in rank. The several judges and barons of the divisions of the high court of justice other than the chiefs, used to be called puisne judges.

PULASKI, COUNT CASIMIR, a Polish patriot and military officer, who participated in the war of the American Revolution; born in 1748. His father, a Polish nobleman, and his brothers were killed fighting against Russia for the liberty of Poland. Casimir escaped to Turkey, whence he proceeded by way of France to join the Americans, then fighting for independence, bearing recommendations from Franklin to Washington, whom he joined in 1777. Entering as a volunteer, he so distinguished himself at the battle of Brandywine as to be promoted by Congress to a cavalry command, with the rank of Brigadier-General. He afterward organized an independent corps of cavalry and light infantry, with which he rendered effectual service under General Lincoln, in South Carolina, in 1779, and in the siege of Savannah, Ga., where, in an assault on the latter place, he was mortally wounded. He died in 1779.

PULITZER, JOSEPH, an American journalist; born in Budapest, Hungary, April 10, 1847. When quite young he came to the United States; served in the Civil War; and found a home in St. Louis, Mo. He began journalism as reporter on the "Westliche Post," of which he afterward became editor and chief proprietor. He was well known in that city as a politician, legislator and Con-

gressman. In 1878 he assumed control of the St. Louis "Post-Dispatch," and in 1883 purchased the New York "World." He endowed a School of Journalism at Columbia University (1903) and gave large sums for educational and philanthropic purposes. He died in 1911.

PULKOWA, a village of Russia, 10 miles S. of the site of a magnificent observatory (lat. 59° 46′ 18″ N. and lon. 30° 19′ 40″ E.), the "St. Petersburg observatory," built by the Czar Nicholas in 1838–1839. In 1882 one of the largest telescopes in the world was erected here. Besides being one of the largest institutions for original research in the world, it is also a school for the training of astronomers and geodesists. It contains the largest refracting telescope in the world, except the 36-inch Lick glass, and the Yerkes telescope at the University of Chicago, Ill., its objective being 30 inches in diameter. It was made by the firm of Alvan Clark & Sons, of Cambridgeport, Mass., the makers (since then) of the glass for the Lick telescope.

PULLEY, in mechanics, one of the six simple machines or mechanical powers. It consists of a small circular plate or wheel which can turn round an axis passing through the centers of its faces, and having its ends supported by a framework which is called the block. The circular plate has a groove cut in its edge to prevent a string from slipping off when it is put round the pulley. With a single fixed pulley (that is one in which the block in which the pulley turns is fixed), there is neither gain nor loss of power; for, as the tension in every part of the cord is the same, if a weight be suspended at one extremity, an equal weight must be applied at the other to maintain equilibrium. Hence, the effect of a fixed pulley is simply to change the direction of a force. By means of movable pulleys one can gain mechanical advantage, greater or less, according to the number and mode of combination of the pulleys.

Fast pulley, a pulley firmly attached to the shaft from which it receives or to which it communicates motion. Loose pulley, a pulley running free on the shaft, to receive the belt and allow it still to traverse without being affected by, or affecting the motion of, the shafting. Sliding pulley, a kind of coupling in which the band-pulley is slipped into or out of engagement with an arm freely attached to the shaft and rotating therewith.

PULLMAN, GEORGE MORTIMER, an American inventor; born in Chautauqua co., N. Y., March 3, 1831; learned the cabinetmaker's trade; settled in Chicago; studied for many years the problem of making journeys by rail more comfortable; and as a result invented the Pullman palace car. In 1863 he started building these cars, and in 1867 organized the Pullman Palace Car Company. He also invented the vestibule train and founded the town of Pullman, Ill., in 1880. He died in Chicago, Oct. 19, 1897.

PULMOBRANCHIATA, an order of gastropod mollusks (also called by some naturalists Pulmonata), in which the respiratory organ is a cavity formed by the adhesion of the mantle by its margin to the neck of the animal. The greater part of them are terrestrial, among these being the snails and slugs.

PULMOTOR, a device used for producing artificial respiration. It is used in cases of drowning, asphyxiation by noxious gases and electric shock. There are several types of pulmotor on the market such as the lung motor, the Brat apparatus and the pulmotor. The pulmotor which automatically makes the respiratory changes is the most common of the various devices. The air used in the pulmotor is a mixture of atmospheric air and pure oxygen, while in the Brat apparatus pure oxygen is used. The pulmotor consists of a tank of compressed oxygen, a reducing valve which connects with an injector, from which a mixture of air and oxygen pass through a hose to a face mask. Although the oxygen in the tank approximates chemical purity, the mixture which is injected into the lungs averages only about 30 per cent. oxygen, an increase of about 9 per cent. over the amount contained in pure air. A valve mechanism causes alternate pressure and suction to be applied at the face mask. The lung motor consists of a pair of pumps so connected that each one alternately pumps fresh air to the face mask or exhausts the air injected by the other pump. Connection may be made to an oxygen tank and the air enriched. It was felt by some people that the backers of the pulmotor had been somewhat extravagant in the claims which they made for their apparatus and a committee was appointed to make a scientific study of its actual worth. The committee which was headed by Professor Yandell Henderson of Yale University acting under the direction of the United States Bureau of Mines, made a series of experiments on various animals, but the results obtained were not conclusive. It was found by the investigation that expiration was caused by suction, the extreme strength of which often caused complete collapse

of the alveoli and small bronchi, and that air was frequently pumped into the stomach in place of the lungs. Like many other instruments they were found to be dangerous in inexperienced or unskilled hands, and it has been suggested that the instruments be used only as an auxiliary to the established manual methods of artificial respiration and only used for periods of a very few minutes. Many cases of resuscitation by use of the pulmotor reported in the newspapers were, upon investigation, found to be greatly exaggerated.

PULPIT, formerly, a stand from which disputants pronounced their dissertations and authors recited their works; a rostrum. Now, a raised place or desk in a church, from which the preacher delivers his sermon.

PULQUE, a vinous beverage, made in Mexico, by fermenting the juice of the various species of the agave. It resembles cider, but has a disagreeable odor, like that of putrid meat.

PULSE, in physiology, the beat or shock felt in any artery when slight pressure is made on it, caused by the systole of the heart. At birth the number of beats are about 140, at the end of the first year 120, at the end of the second 110; during middle life between 70 and 80, and in old age usually a little more. To feel one's pulse is to sound one; to try to discover one's opinions, views, or feelings.

PULSE, a general name for leguminous plants or their seeds; leguminous plants, such as beans, peas, etc.

PULSOMETER, a form of pump for raising water, by the condensation of steam, in a vessel situated at such elevation above the water supply that the atmospheric pressure will raise the water to the chamber and operate the valves.

PULTENEY, WILLIAM, Earl of Bath, an English statesman; born in 1684. He studied at Oxford and entered Parliament where he won a brilliant reputation. At first the friend of Walpole, he became the head of a party of malcontent Whigs, the "Patriots," in 1728, and was henceforth the minister's bitterest opponent. He was Bolingbroke's chief assistant in the paper called the "Craftsman," which involved him in many political controversies. In 1731 he wrongly ascribed to Lord Hervey the authorship of a scurrilous pamphlet; a duel was the consequence, fought with swords in St. James' Park, when both combatants were slightly wounded. On the resignation of Walpole in 1741 Pulteney was sworn of the privy-council, and soon afterward created Earl of Bath; and from that time his popularity was gone. His prose was effective and his verse graceful. He died in 1764.

PULVERMACHER CHAIN, a form of galvanic battery consisting of a series of small wooden cylinders on which a zinc and copper wire are coiled side by side, but without touching each other. The zinc of one cylinder, touching the copper of the adjacent one, forms with it a couple. The whole is immersed in vinegar diluted with water.

PUMA, the *Felis concolor*, the *couguar* of the French, the *leon* of the South Americans, and the panther or "painter" of the trappers. It is the largest feline of the New World, measuring 40 inches from the nose to root of tail, which is about 20 inches more; the head is small, mane absent; general color of upper surface tawny yellowish-brown. The young, when born, are spotted with brown, and the tail is ringed. The puma is destructive, and slays far more than it can eat, but rarely, if ever, attacks man, and may be tamed with little difficulty. It ranges from Canada to Patagonia, being most numerous in the forests of Central America.

PUMICE, a very porous, or cellular, froth-like rock, of extreme lightness, floating on water. In commerce, pumice stone. It is imported from the Lipari Isles, and is used for polishing metals and marble, and smoothing the surface of wood and pasteboard.

PUMP, a machine, engine, or device, consisting of an arrangement of a piston, cylinder, and valves, for raising water or other liquid to a higher level, or for compressing or exhausting air and other gases.

PUMP, a light shoe, or slipper, with a single unwelted sole, and chiefly worn by dancers.

PUMPELLY, RAPHAEL, an American geologist; born in Owego, N. Y., Sept. 8, 1837. In his early life he conducted explorations for the governments of Japan and China; was professor at Harvard for several years; and from 1879 to 1892 geologist in charge of the Archæan division of the United States Geological Survey. His chief works are: "Geological Researches in China, Mongolia, and Japan" (1867); "Across America and Asia" (1870); "Mineral Industries of the United States" (1886); "Geology of the Green Mountains" (1894); "Explorations in Central Asia" (1905), etc. His "Reminiscences" appeared in 1918.

PUMPERNICKEL, a species of coarse bread, made from unbolted rye, which forms the chief food of the Westphalian peasants.

PUMPKIN, the *Cucurbita pepo*, or more loosely any gourd akin to it. It is a native of Astrachan, but is now cultivated throughout India and other parts of the tropics; also in the United States.

PUN, a play on words, the wit of which depends on a resemblance in sound between two words of different and perhaps contrary meanings, or on the use of the same word in different senses, etc.

PUNCH, with his wife Judy and dog Toby, the chief characters in a popular comic puppet show, of Italian origin, the name being a contraction of Punchinello, for Pulcinello, the droll clown in Neapolitan comedy. The full-grown modern drama is ascribed to an Italian comedian, Silvio Fiorillo, about 1600.

PUNCH, or the **LONDON CHARIVARI**, the chief of English comic journals, a weekly magazine of wit, humor, and satire in prose and verse, illustrated by sketches, caricatures, and emblematic devices. It was founded in 1841, the first number appearing July 17 of that year, under the joint editorship of Henry Mayhew and Mark Lemon.

PUNCHEON, a liquid measure of capacity containing from 84 to 120 gallons.

PUNCHINELLO. See PUNCH.

PUNCTUATION, the act, art, or method of punctuating or pointing a writing or discourse; the act, art, or method of dividing a discourse into sentences, clauses, etc., by means of points or stops. The first printed books had only arbitrary marks here and there, and it was not till the 16th century that an approach was made to the present system by the Manutii of Venice.

PUNGWE, a river of Portuguese East Africa, forming the principal waterway to Manicaland and Mashonaland; its mouth is situated about 25 miles N. E. of Sofala and 130 S. W. of the Zambezi delta.

PUNIC, the language of the Carthaginians. It was an offshoot of the Phœnician, belonging to the Canaanitish branch of the Semitic tongues.

PUNIC WARS, three great wars between the Romans and the Carthaginians. The first (264–241 B. C.) was for the possession of Sicily, and ended by the Carthaginians having to withdraw from the island. The second (218–202 B. C.), the war in which Hannibal gained his great victories in Italy, was a death struggle between the two rival powers; it ended with decisive victory to the Romans. The third (149–146 B. C.) was for the destruction of Carthage, which was effected in the last-named year.

PUNISHMENT, a penalty inflicted on a person for a crime or offense, by the authority to which the offender is subject; a penalty imposed in the enforcement or application of law.

PUNJAB, an extensive territory in the N. W. of India, most of it under direct Anglo-Indian authority, and ruled by a lieutenant-governor, a large portion of the remainder constituting the protected state of Kashmir.

PUNJNUD, the name given to the stream which pours into the Indus, about 70 miles above the Sind frontier, the combined waters of the five rivers, the Sutlej, the Beas, the Ravi, the Chenab, and the Jhelum.

PUNKA, or **PUNKAH**, a large, broad fan, suspended from the ceiling, or a number of such fans, acting simultaneously, and worked by an attendant.

PUNO, capital of department of Puno, Peru, on shore of Lake Titicaca. Center of trade with Bolivia, and connected by rail with Arequipa. Little agriculture in department, but industries include gold and silver mining and stock breeding. Town has churches, college, and hospital. Pop. about 10,000.

PUNT, a large, square-built, flat-bottomed vessel, without masts, used as a lighter for conveying goods, etc., and propelled by poles. Also, a small, flat-bottomed boat, with square ends, used in fishing, and propelled by poles.

PUNTA ARENAS, the name of several cities and towns: (1) The chief port of Costa Rica on the Pacific. The principal export is coffee, and after that india-rubber, hides, dye-woods, and tortoise-shell. Pop. (1916), about 20,000; (2) A town in Patagonia.

PUPA, or **PUPE**, in entomology, the third stage in the development of an insect between the larva and the adult.

PUPIN, MICHAEL IDVORSKY, an American scientist; born in Idvar, Hungary, Oct. 4, 1858; was graduated at Columbia University in 1883; studied at the University of Berlin; and was appointed Adjunct Professor of Mechanics at Columbia University in 1889. In 1901 he announced the discovery of a new method of ocean telephony. He was a member of the American Mathematical Society, American Philosophical Society, etc. He wrote "Propagation of Long

Electrical Waves"; "Wave Propagation Over Non-Uniform Conductors." Director Phenix Research Laboratories (1911). During the World War he placed his wireless inventions at the service of the U. S. Government (1917); was Honorary Consul-General of Serbia in New York. Organized a Serbian Relief Association at Columbia University (1915).

PUPPET SHOWS, the performances of images of the human figure moved by fingers, cords, or wires, with or without dialogue.

PURÂNA, the last great division of Hindu sacred literature. Eighteen principal Purânas are enumerated, called Brâhma, Pâdma, Brahmânda, Agni, Vishnu, Gâruda, Brahmavaivarta, Siva, Linga, Nâradîya, Skanda, Mârkandeya, Bhavishyat, Mâtsya, Vâraha, Kaurma, Vâman, and Bhâgavat. None of them is dated. Some quote from others, and the period of their redaction embraces perhaps a dozen centuries. In their present form none of them appears older than the 9th century A. D. The most celebrated are the Vishnua and the Bhâgavat Purânas.

PURBECK, ISLE OF, a peninsula S. of Dorsetshire, so separated from the mainland on the N. by Poole harbor and the Frome as to be connected with it by only a very narrow isthmus. It is about 12 miles long by 7 miles broad. The prevailing rock is limestone.

PURCELL, HENRY, an English composer; born in 1658. He became organist of Westminster Abbey, and in 1882 of the chapel-royal. In 1680, probably, he composed "Dido and Æneas," which has been called the first genuine English opera. He composed mainly anthems and sacred music, all of great excellence. In 1690 he wrote the music for Dryden's version of "The Tempest." In 1691 he produced the music to Dryden's "King Arthur," considered his dramatic masterpiece. In 1694 he wrote his great works "The Jubilate" and "Te Deum," and in 1695 the music to "Bonduca," in which was "Britons, Strike Home." He died in 1695, and was buried in Westminster Abbey.

PURCHAS, SAMUEL, an English clergyman; born in Thaxted, Essex, England, in 1577. He was educated at Cambridge, and was rector of St. Martin's, London. His great works were "Purchas, His Pilgrimage, or Relations of the World and the Religions Observed in All Ages" (1613); and "Hakluyt's Posthumus, or Purchas His Pilgrimes: Containing a History of the World, in Sea Voyages and Land Travels by Englishmen and Others" (1625). Another work is "Purchas His Pilgrim: Microcosmus, or the History of Man; Relating the Wonders of His Generation, Varieties in His Degeneration, and Necessity of His Regeneration" (1619). He died in London, in September, 1626.

PURCHASE, in law, the suing out and obtaining a writ; the obtaining or acquiring the title of lands and tenements by money, deed, gift, or any means except descent. In mechanics, a means of increasing applied power; any mechanical hold, advantage, power, or force applied to the raising or removing of heavy bodies: mechanical advantage gained by the application of any power.

PURDUE UNIVERSITY, a coeducational non-sectarian institution in Lafayette, Ind.; founded in 1874; reported at the close of 1919: Professors and instructors, 187; students, 2,470; president, W. E. Stone, A. M., LL. D.

PURGATORY, in comparative religions, any place or state succeeding the moral purification. In Roman theology, a place in which souls who depart this present life, and serving as a means of life in the grace of God, suffer for a time, because they still need to be cleansed from venial, or have still to pay the temporal punishment due to mortal sins, the guilt and eternal punishment of which have been remitted.

PURIFICATION, a Jewish rite. It was mainly the one through the performance of which an Israelite was readmitted to the privilege of religious communion, lost through uncleanness.

PURIM, the Festival of Lots, which was instituted by Mordecai (Esther ix: 27, x: 3), and is celebrated to this day by the Jews on the 14th and 15th of the month Adar (March), in commemoration of their wonderful deliverance from the destruction with which they were threatened by Haman.

PURITAN, the name given, at first perhaps in contempt, to those clergymen and others in the reign of the English Queen Elizabeth, who desired a simpler, and what they considered to be a purer form of worship than the civil and ecclesiastical authorities sanctioned. The Puritan controversy commenced as early as 1550, when Hooper, appointed to the see of Gloucester, refused to be consecrated in the ecclesiastical vestments then in use. New England was settled very largely by the Puritans. Also, one who has severely strict notions as to what is proper or who is strict in his religious duties.

PURPLE BLACK, a preparation of madder, of a deep purple hue, approaching to black; its tints, with white-lead, are of a purple color.

PURPLE HERON, in ornithology, the *Adrea purpurea*, about the same size as the common heron.

PURPURA, in zoölogy, a genus of *Buccinidæ;* British species, abounds on the coast at low water, and is very destructive to mussel beds. Also, a peculiar unhealthy condition of the blood and tissues, evinced by purple spots, chiefly on the legs, due to unhealthy surroundings, want of proper food, intemperance, and other depressing causes.

PURSER, on shipboard, the officer whose duty is to keep the accounts of the ship to which he is attached. In mining, the paymaster or cashier of a mine, and the official to whom notices of transfer are sent for registration in the cost-book.

PURSLANE, a plant of the genus *Portulaca* (*P. oleracea*), with fleshy succulent leaves, naturalized throughout the warmer parts of the world.

PURSUIVANT, in heraldry, an attendant on the heralds; one of the third and lowest order of heraldic officers. There are four pursuivants attached to the English College of Arms, styled Rouge Croix, Blue Mantle, Rouge Dragon, and Portcullis.

PURU, or **PURUS**, a river of South America, which rising in the E. of Peru enters Brazil, and flowing N. E. after a course of 400 miles joins the Amazon about 100 miles above the confluence of the Madeira with the latter.

PURVEYANCE, formerly in England the exercise by officials called purveyors of the royal prerogative, involving a right of pre-emption, by which the king was authorized to buy provisions and necessaries for the use of his household at an appraised value, in preference to all his subjects.

PUS, in physiology and pathology, the product of suppuration, a thick, viscid, yellow fluid.

PUSEY, EDWARD BOUVERIE, an English theological writer, a leader of the Anglo-Catholic (Tractarian) party in the Established Church; born near Oxford in 1800. He was associated with Newman and others in the "British Critic," "Tracts for the Times," etc., and his conspicuousness from his social position (nephew of one earl and grandson of another, professor and canon of Christ Church), wealth and munificent charities, caused the Oxford Movement to be known as "Puseyism." He published: "The Holy Eucharist a Comfort to the Penitent" (1843), a sermon which resulted in his suspension for three years; two sermons on "The Entire Absolution of the Penitent" (1846), equally revolutionary. Of his larger works the most important are: "The Doctrine of the Real Presence" (1855); "The Real Presence of the Body and Blood of Christ the Doctrine of the English Church" (1857); "An Eirenicon." He died Sept. 16, 1882.

PUSHKIN, ALEXANDER. See POUSHKIN.

PUSHTU, or **PUKHTU**, the language of the Afghans proper (see AFGHANISTAN).

PUSTULE, a pimple, a little blister. Also a vesicle containing pus.

PUTCHOCK, or **PUTCHUK**, the roots of *Aplotaxus lappa* (*Saussurea Lappa, Calc,* Exhib. Rep.). It is a tall composite plant, with purple florets, growing on the mountains of Cashmere. The root is collected in enormous quantities, and exported to China, to be used as incense. It is given in India in cough, asthma, fever, cholera, dyspepsia, etc. Its dried powder is the principal ingredient in an ointment for ulcers; it is also a hair wash.

PUTEAUX, a town 2 miles from the W. boundary of Paris, on the left bank of the Seine, opposite to the Bois de Boulogne. Many Parisians have fine villas here. There are manufactures of dyestuffs and chemicals, dyeing, and calico printing. Pop. about 35,000.

PUTNAM, a city of Connecticut, one of the county-seats of Windham co. It is on the Quinebaug river, and on the New York, New Haven, and Hartford railroad. It is the center of an important agricultural region and its industries include iron works and the manufacture of cotton and woolen goods, silks, trunks, boots and shoes, etc. The city contains a public library and a hospital. Pop. (1910) 7,280; (1920) 7,711.

PUTNAM, FREDERICK WARD, an American scientist; born in Salem, Mass., April 16, 1839; was graduated at Harvard University in 1862; became curator of ornithology at the Essex Institute in Salem in 1856, superintendent of the East Indian Marine Society's Museum there in 1867, and chief of the Department of Ethnology at the World's Columbian Exposition in Chicago in 1893. He edited many volumes of the "Annual Reports of the Trustees of the Peabody Museum of Archæology and Ethnology," and "Proceedings of the Essex Institute." President American

Folk-lore Society (1901) and of American Anthropological Society (1905). Died 1915.

PUTNAM, GEORGE HAVEN, an American publisher and author, son of George P.; born in London, England, April 2, 1844. He entered the publishing business in 1866, and was the head of the firm of G. P. Putnam's Sons, New York. His works include: "International Copyright" (1879); "Authors and Publishers" (1883); "Authors and Their Public in Ancient Times" (1893); "Books and Their Makers during the Middle Ages" (1896); "Abraham Lincoln" (1909); "Memoirs of a Publisher" (1915).

PUTNAM, GEORGE PALMER, an American publisher and author; born in Brunswick, Me., Feb. 7, 1814. In 1848 he established the publishing house now conducted under the name of G. P. Putnam's Sons; and also founded "Putnam's Magazine." His works include: "American Facts" (1845); "The World's Progress" (1850); "Ten Years of the World's Progress"; etc. He died in New York, Dec. 20, 1872.

PUTNAM, HERBERT, an American librarian; born in New York City, Sept. 20, 1861; was graduated at Harvard in 1883; studied at the Columbia Law School; was admitted to the Minnesota bar in 1886; librarian of the Boston Public Library in 1895-1899; librarian of Congress since 1899. Twice President of the American Library Association.

PUTNAM, ISRAEL, an American general in the Revolutionary War; born in Danvers, Mass., in 1718. He was a farmer until the French and Indian war broke out, when, at the age of 36, he took service in the English army having command of a company of "rangers." When the dispute between his country and England commenced, he was created Major-General by Congress; and at Bunker Hill, New York, and during Washington's retreat through New Jersey, he showed himself one of the bravest of the patriot leaders. In 1779 he was stricken with paralysis. His character is well depicted by the inscription on his tomb: "He dared to lead where any dared to follow." He died in 1790.

PUTNAM, WILLIAM LE BARON, an American jurist; born in Bath, Me., May 26, 1835; was a member of a commission to arrange with the British government the rights of American fishermen in Canadian waters in 1887; served also as a commissioner under the treaty of Feb. 8, 1896, between the United States and Great Britain; and was appointed a judge of the United States Circuit Court in 1892. Died 1918.

PUTNAM, FORT, the principal defense of West Point during the Revolution. Now in ruins.

PUTNEY, a suburb of London, England, in Surrey, 6 miles W. S. W. of Waterloo, on the S. side of the Thames. It is a great rowing place, the starting point of the Oxford and Cambridge boat race. The parish church, with a 15th century tower and the chantry of Bishop West of Ely, was mainly rebuilt in 1836; in the churchyard is Toland's grave. Putney is the birthplace of Thomas Cromwell and Gibbon, and the death place of Pitt and Leigh Hunt.

PUTNIK, VOIVODE (WAR LEADER) RADOMIR, Serbian general, born in 1847, in Serbia, but son of Austrian Serbs; educated in the military academy in Belgrade; served as captain of infantry during the war against Turkey, in 1876; served in the war against Bulgaria, 1885; and at the beginning of the first Balkan War, when Serbia, Bulgaria, Montenegro and Greece allied themselves against Turkey, in 1912, he was raised to the rank of Voivode, meaning literally, war chief, the first Serbian officer to attain this special rank. As such he was in command of all the Serbian forces, during the second Balkan War, as well, when Serbia fought Bulgaria. When the Austrians opened hostilities, in 1914, by their attempted invasion of Serbia, Voivode Putnik was still in command, and so remained until the final invasion in 1915, when Austria received German reinforcements under Von Mackensen.

PUTREFACTION, the apparently spontaneous decomposition of organic substances, especially those rich in nitrogen.

PUTS and CALLS, terms used in American stock dealings. The trade in privileges is something which is scarcely understood outside of Board of Trade and Stock Exchange circles. For $1 per 1,000 bushels a trader can purchase the privilege to "put" (sell) or "call" (buy) from the seller of the privilege at a stipulated price and within a stipulated time. The ordinary privileges are sold one day to be good to the close of the next session. In inactive markets the "put" and "call" prices may be close together and close to the market price of the property. They are countenanced by the State of New York and are a regular feature in the New York Stock Exchange. In Illinois they are specifically classed as gam-

bling operations. The theory of "privileges" is that they are a species of insurance by which an operator can protect himself against market fluctuations. A trader who is "short" in the market can protect his position to a certain degree by buying "calls"; a "long" can prevent losses in the same degree by buying "puts." The insurance proposition is a theory, however, as "privileges" more often serve to originate new trades than to serve as an insurance on existing business conditions.

PUTTY, calcined tin, or oxide of tin and lead mixed in various proportions, used as polishing powder by opticians and lapidaries. In plastering, a fine mortar, nearly all lime, used in stopping crevices of shrinkage. In glazing, a composition of pounded whiting and linseed oil, beaten up into a tough tenacious cement. In pottery, the mixture of ground materials in which in potteries earthenware is dipped for glazing. In foundry work, the mixture of clay and horsedung used in making molds in foundries.

PUTUMAYO, a province of Colombia, in the S. E., bordering on Brazil, Ecuador and Peru, watered by the rivers of the same name, which is a tributary of the Amazon. The district is rich in rubber, exploited by British syndicates, driven out of existence in 1912 consequent on exposures of cruelty to the natives. Part of the province is claimed by Ecuador. The Putumayo river crosses the equator and flows 1150 miles before being received into the Amazon in Brazil. Pop. about 35,000.

PUTUMAYO, or **IÇA**, a tributary of the Amazon, rising in Colombia, and flowing S. E. for 950 miles.

PUVIS DE CHAVANNES, PIERRE, a French painter; born in Lyons, France, Dec. 14, 1824. He studied under Couture and Henri Scheffer; painted mural decorations for libraries, etc., in France, especially "Ste. Geneviève" at the Pantheon, Paris; "The Sacred Grove"; a mural painting for the Boston, Mass., Public Library (1894); etc. He died in Paris, Oct. 25, 1898.

PUY, LE, or **LE PUY-EN-VELAY**, a town of France (department Haute-Loire). It consists of the new town in a valley and the old town, this latter one of the most picturesque in France. The town of Le Puy stands on the steep slopes of Mount Anis (2,050 feet), from the summit of which starts up precipitously the basaltic mass called Mont Corneille, crowned by a colossal figure (53 feet) of the Virgin, made of Russian cannon brought from Sebastopol. The most notable building is the Romanesque cathedral (6th-12th century). Lace and thread work are manufactured. Pop. about 22,500.

PUYA, in botany, a synonym of Pouretia, a genus of *Bromeliaceæ* (Lindley). *P. chinensis* yields an extract used in healing broken bones, and the spike of *P. lanuginosa* is a transparent gum.

PYÆMIA, or **PYEMIA**, a diseased condition in which the blood is poisoned by pus or by some of its constituents; blood poisoning; septicæmia.

PUY-DE-DÔME, a central department of France, containing an area of 3,090 square miles and a pop. of about 525,000. The W. side of the department is an elevated volcanic region. (See FRANCE). The highest cones are Puy-de-Sancy (6,188 feet) and Puy-de-Dôme (4,806); on the E. side the Forez Mountains (5,380) march with the frontier. Agriculture and cattle breeding are the chief occupations. The principal minerals are coal and lead. Hot and cold mineral springs are abundant.

PYCNOGONUM, a genus of Arachnida, the sea spiders. Some species are parasitic upon fishes and other marine animals.

PYGMALION, in Greek mythology, grandson of Agenor, King of Cyprus. He fell in love with an ivory statue of a young maiden he himself had made, and prayed to Aphrodite to give it life. His prayer was granted, on which he married the maiden, who bore him Paphus.

PYGMY, or **PIGMY**, in classical mythology, one of a fabulous nation of dwarfs dwelling somewhere near the shores of the ocean, and maintaining perpetual wars with the cranes. Also, a very short or dwarfish person; a dwarf; anything very little. In zoölogy, the chimpanzee.

PYLADES, in Greek mythology, son of Strophius, King of Phocis, and Anaxibia, the sister of Agamemnon, after whose murder by Clytemnestra, their son Orestes, being carried secretly to the court of Strophius, formed the friendship with Pylades which has become proverbial. He assisted Orestes in murdering Clytemnestra, and eventually married his sister Electra.

PYLE, HOWARD, an American illustrator and author; born in Wilmington, Del., March 5, 1853. He was an illustrator for periodicals, and became popular also as a writer, chiefly of juvenile literature. His works include: "Within the Capes" (1885), a novel; "Pepper

and Salt" (1887); "Otto of the Silver Hand" (1888); "Buccaneers and Marooners of America" (1891); "Jack Ballister's Fortunes"; "The Garden Behind the Moon" (1895); "Story of Launcelot" (1907); "Story of the Grail" (1910). Died 1911.

PYLONS, in Egyptian architecture, the name given to towers or masses of masonry, somewhat resembling truncated pyramids, placed one on each side at the entrance of temples.

PYLORUS, the small and contracted end of the stomach leading into the small intestines.

PYM, JOHN, an English statesman, born in Somersetshire, England, in 1584. He studied at Oxford and became famous as a lawyer. He entered Parliament in 1614, and during the reign of James he attained great influence by his opposition to the arbitrary measures of the king. In 1626 he took part in the impeachment of Buckingham and was imprisoned. In the Short Parliament of 1640 Pym and Hampden were exceedingly active as leaders of the popular party. Pym impeached Strafford and at his trial appeared as accuser. He was the main author of the Grand Remonstrance, the final appeal presented in 1641, and one of the five members to arrest whom the king went to the House of Commons in January, 1642. When civil war became inevitable Pym was appointed one of the committee of safety. He died in 1643.

PYORRHŒA ALVEOLARIS, a disease of the sockets of the teeth, also called Rigg's Disease. The symptoms are pains in chewing, and redness of the gums combined with a tendency to recede, so that the teeth eventually loosen and fall out. The treatment consists in the removal of deposits and the working out of the pus sockets. The disease in a chronic state deleteriously affects the digestion.

PYRAMID, in Egyptian antiquities, a solid structure substantially invariable in form, viz., a simple mass resting on a square or sometimes approximately square base, with the sides facing with slight deviations toward the four principal winds, and tapering off gradually toward the top to a point or to a flat surface, as a substitute for an apex. The pyramids were constructed in platforms, and then revêted or coated with blocks or slabs of granite. The interior of these massive structures contains narrow passages, and some totally dark halls or chambers, and probably served as the burial places of the kings who had caused them to be constructed. The pyramids of Egypt begin immediately S. of Cairo, and continue S. at varying intervals for nearly 70 miles. The largest is that of Cheops, at Ghizeh, standing on a base each side of which was originally 764 feet long, but owing to the removal of the coating is now only

PYRAMIDS, EGYPT

PYNCHON, WILLIAM, an American colonist; born in Springfield, England, about 1590. He emigrated to New England and founded the town of Springfield, Mass. In 1650 he published "The Meritorious Price of Our Redemption," opposing the Calvinistic view of atonement. The book was denounced as heretical, and the author was compelled to return to England to avoid persecution. His other works are: "The Jewes Synagogue" (1652); "How the First Sabbath was Ordained" (1654). He died in Wraysbury, England, Oct. 29, 1662.

746 feet. The principal chamber, the so-called Crowning Hall or King's Chamber, is 34 feet, 3 inches long, and 17 feet, 1 inch wide.

In Mexican antiquities, the Teocallis, or Houses of the Gods, which have come down from Aztec times, are four-sided pyramids rising by terraces to a considerable height. A group of such erections still exist at Teotihuacan, about 20 miles N. E. of the City of Mexico.

There are two large pyramids, with some hundred smaller ones. The base of the largest is 900 feet long, its height 160 feet.

In anatomy, a conical bony eminence in the anterior wall of the tympanum of the ear. In geometry, a polyhedron bounded by a polygon, having any number of sides, called the base, and by triangles meeting in a common point, called the vertex. Pyramids take different names according to the natures of their bases. They may be triangular, quadrangular, etc., according as their bases are triangles, quadrilaterals, pentagons, etc. In botany, the American calumba or Indian lettuce, *Frasera carolinensis*. Pyramid pool: A game played with 15 red balls and one white ball, the former being placed in a triangular form at a spot on the top of the table. The object of the players, who play in turn with the white ball, is to pocket as many red balls as possible.

PYRENEES, an extensive mountain range in the S. of Europe, dividing France from Spain, and extending almost in a straight line from St. Sebastian, on the Bay of Biscay, to Cape Creux, on the Mediterranean. Length 270 miles, with a breadth from 50 to 100 miles. The principal summits are Mount Perdu, which has an elevation of 10,994 feet; the Vignemale, 10,820 feet; and the Peak of Nethou, 11,168 feet. There are many passes; the total number, including paths for pedestrians, exceeds 50; but the carriage-roads hardly exceed five; and of these, the most frequented are from Jonquera to Perpignan on the E., and from St. Sebastian to St. Jean de Luz on the W., and from Pampeluna to St. Jean Pied de Port. The passes in the interior are over very high ground; Pineda is 8,248 feet above the sea; Gavarnie, 7,654; Lavareze, 7,350; and Tourmalet, 7,143. The principal rivers rising in the Pyrenees are the Adour, Garonne, and Aude, flowing N., and the Llobregat, and numerous affluents of the Ebro, flowing toward the S.

PYRENEES, BASSES, a department in the S. W. corner of France, between the Landes and Spain, and having the Bay of Biscay on the W.; area 2,977 square miles; pop. about 435,000. It is divided into the arrondissements of Pau, Oloron, Orthez, Bayonne, and Mauléon. Chief town, Pau. The department occupies the N. slopes of the western Pyrenees. Agriculture is the principal industry; large herds of cattle and sheep are fed on the extensive pastures, and many swine in the wide forests. Of the numerous mineral springs the most important are those of Biarritz, Eaux-Bonnes, and Eaux-Chaudes. The W. half of the department is the home of the BASQUES (*q. v.*).

PYRENEES, HAUTES, a department of France lying E. of Basses-Pyrénées; a part of the old province of Gascony; area, 1,749 square miles; pop. about 205,000. As its name implies, it contains the loftiest summit of the PYRENEES (*q. v.*), and is divided into the three arrondissements of Tarbes, Argelès, and Bagnères de Bigorre; chief town, Tarbes. The principal rivers are the Adour and the Gave de Pau. The well-cultivated and artificially watered lowlands yield good crops of cereals, leguminous plants, and fruits of every kind, including the grape. Cattle, sheep, and swine are reared. Marble and slate are quarried. In this department are the springs of St. Sauveur, Bagnères-de-Bigorre, Barrèges, and Cauterets.

PYRENEES-ORIENTALES, a S. department of France; bounded on the E. by the Mediterranean and on the S. by the Pyrenees; area, 1,598 square miles; pop. about 213,000. It is divided into the three arrondissements of Perpignan, Prades, and Céret. The chief town is Perpignan. Agriculture is extensively prosecuted, but wines constitute the wealth of the district, and include the red wines of Roussillon, the white muscatel of Rivesaltes, and others. This department takes the front rank as a producer of iron ore; granite, slate, and limestone are quarried. There are mineral springs at Amélie-des-Bains, and elsewhere.

PYRETHRUM, in botany, a genus of *Chrysanthemeæ*.

PYRHELIOMETER, an instrument invented by Pouillet for measuring the amount of heat radiated from the sun.

PYRIDINE, C_5H_5N, a liquid, colorless when pure, possessing a characteristic and unpleasant odor. Boiling point, 115° C. Obtained in the distillation of coal tar. Being strongly basic, pyridine combines with the sulphuric acid used in the process of purifying coal tar products. On addition of soda to the acid solution, pyridine is liberated, and is isolated by fractional distillation. Pyridine is used as a denaturant for alcohol, and as a solvent in rubber, paint and other industries.

PYRITES, an isometric mineral occurring frequently crystallized, also massive, in mammillary forms with fibrous structure, and stalactitic with crystalline surface. Occurs abundantly distributed in rocks of all ages, either as crystals, crystal-grains, or nodules, also in metalliferous veins.

PYROGALLIC ACID, in chemistry, $C_6H_6O_3=C_6H_3(OH)_3$, pyrogallol, an acid, discovered by Scheele. Extensively used in photography as a reducing agent.

PYROGRAPH, an apparatus for engraving on wood or leather by means of a red-hot metallic point.

PYROLIGNEOUS ACID, impure acetic acid, obtained by the destructive distillation of wood.

PYROLITH, or **LIQUID MARBLE**, a composite, plastic material that so closely resembles marble that no one can detect any difference. It fulfils the requirements of the sculptor as to durability and hardness and forms an imperishable material, easy to work and capable of receiving every delicate line and curve of the clay model. It was discovered by George Julian Zolnay, an American sculptor, the result of years of hard work.

PYROLUSITE, one of the most important of the ores of manganese. Used in preparing oxygen gas, with which it parts at a red heat; and also in glass making.

PYROMETER, a term originally applied to an instrument in the form of a single metallic bar, employed by Muschenbroek about 1730, to indicate temperatures above the boiling point of mercury, 660° F. It is now applied to any instrument used for such purpose.

Tremeschini's pyrometer is founded on the expansion of a thin plate of platinum, heated by a mass of metal previously raised to the temperature of the medium. The Trampler pyrometer is based on the difference in the coefficients of dilatation for iron and graphite; the Gauntlet pyrometer on the difference of those of iron and fire-clay. The Ducomet pyrometer consists of a series of rings made of alloys which have slightly different melting points. In pyrometers on the Watertype principle, the temperature is determined by noting the amount of heat communicated to a current of water of known temperature which is kept circulating in the medium to be observed.

PYROPE, in mineralogy, one of the garnet group. Color, a deep-red; transparent. Found associated with serpentines, and in streams in Bohemia. Much used in jewelry.

PYROPHYLLITE, a hydrated silicate of alumina, occurring in foliated masses, which split into layers on heating. Crystallizes in the monoclinic system. The color may be either yellow or green, some specimens being almost pure white. It somewhat resembles talc, possessing a soapy feeling, and is used in the manufacture of tailors' chalk and slate pencils. In China and Japan harder varieties are used for making small images. It is found in North Carolina, Georgia, Arkansas, Brazil, Sweden and the Urals.

PYROSCOPE, an instrument, invented by Leslie, to measure the intensity of heat radiating from a hot body or the frigorific influence of a cold body. The instrument is like a differential thermometer, one ball being covered with thick silver-leaf; the other ball is naked and forms the pyroscope.

PYROSOMA, the sole genus of *Pyrosomidæ*, a family of Tunicata, with three species. They are brilliantly phosphorescent, and Péron compared them to small incandescent cylinders of iron.

PYROTECHNY, in the proper sense, the science which teaches the management and application of fires. In the more popular sense, however, the word chiefly refers to the art of making fireworks. The principal ingredients used are purified saltpeter, sulphur, and charcoal.

PYROXENE, a name used for a group of minerals of very variable composition and origin, but all of which are referable (like the analogous group of amphiboles) to the same chemical type, under the general formula $ROSiO_2$, where R may represent lime, magnesia, the protoxides of iron and manganese, and sometimes soda, potash, and oxide of zinc. Two or more of these bases are always present, the most frequent being lime, magnesia, and protoxide of iron, lime being always present and in a large percentage.

PYROXYLIC SPIRIT, WOOD SPIRIT, or **WOOD NAPHTHA**, a mixture of acetone, methyl-alcohol, acetate of methyl, etc., obtained by the destructive distillation of wood in the manufacture of PYROLIGNEOUS ACID (*q. v.*). It is of nearly equal value to alcohol in making varnishes, as it dissolves the resins, oils, and other similar substances. It is used in making METHYLATED SPIRIT (*q. v.*).

PYROXYLIN, a form of nitrocellulose, produced by the action of a mixture of sulphuric and nitric acids, slightly diluted with water, on cotton. Soluble in a mixture of alcohol and ether. This solution, on evaporating, leaves a film of collodion. Pyroxylin is largely used in photography. (See NITROCELLULOSE).

PYRRHIC, a species of warlike dance, which is said to have been invented by Pyrrhus to grace the funeral of his

father Achilles. It was danced by boys in armor, accompanied by the lute or lyre. Also a metrical foot consisting of two short syllables.

PYRRHO, a celebrated philosopher of Elis, and founder of the sect called Skeptics, or Pyrrhonists, flourished about 340 B. C. He was originally a painter, but afterward became a disciple of Anaxarchus, whom he accompanied to India in the train of Alexander the Great, and while there obtained a knowledge of the doctrines of the Brahmins, Gymnosophistes, Magi, and other eastern sages. On the return of Pyrrho to Greece, the inhabitants of Elea made him their high priest, and the Athenians gave him the rights of citizenship. He died in 288 B. C.

PYRRHUS, King of Epirus, being obliged, on the murder of his father, to seek safety by flight, found a home, parent, and tutor in Glaucus, King of Illyria, and ascended his father's throne, 295 B. C. Having attempted to possess himself of Macedon, he was defeated in a great battle. In 281 B. C. he made war on the Romans with the Samnites and in a battle fought on the Syris, in Calabria, totally defeated the Roman army. It cost him heavily however and the Romans ultimately triumphed. Pyrrhus returned to Greece, and, in a subsequent war with the Argives, was killed, by a tile thrown on his head from the roof of a house, as he entered Argos, 273 B. C.

PYRUS, a genus of Pomaceæ, of Pomeæ, a tribe of Rosaceæ. Fruit two to five celled, with cartilaginous walls. North temperate zone. Known species about 40. Five most familiar are: *Pyurus communis*, the wild pear, *P. malus*, the wild or crab apple, *P.* (*Sorbus*) *torminalis*, the wild service, *P.* (*Sorbus*) *aria*, the white beam-tree, and *P.* (*Sorbus*) *aucuparia*, the mountain ash or rowan tree.

PYTHAGORAS, the celebrated Greek philosopher, born in Samos, about 580–570 B. C. He is said to have traveled extensively, especially in Egypt. Aversion to the tyranny of Polycrates, in Samos, is said to have been the cause of his quitting that island, and he ultimately settled, between 540–530 B. C. at Crotona, one of the Greek cities of Southern Italy. There he set himself to carry out the purpose of instituting a society. Pythagoras himself was the chief, or general, of the order. Similar societies were founded in other cities of Italy. His teachings relating to these subjects became at length the occasion of a popular rising against the Pythagoreans at Crotona, 504 B. C.—the house in which they were assembled was burned, many perished and the rest were exiled. Similar tumults with similar results, took place in other cities. Among the doctrines of Pythagoras are the following: that numbers are the principles of all things; that the universe is a harmonious whole (kosmos), the heavenly bodies by their motion causing sounds (music of the spheres); that the soul is immortal, and passes successively into many bodies (metempsychosis); and that the highest aim and blessedness of man is likeness to the Deity. Pythagoras is said to have been the first who took the title of philosopher, and the first who applied the term Kosmos to the universe. He died in Metapontum, Magna Græcia, about 500 B. C.

PYTHAGOREAN THEOREM, the 47th proposition of the first book of Euclid's "Elements," which shows that in any right-angled triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides.

PYTHIAN GAMES, one of the four great national festivals of the Greeks, held in the Crissæan plain, near Delphi (anciently called Pytho), said to have been instituted by Apollo after vanquishing the snaky monster, Python, and celebrated in his honor every four years. Originally the contests were restricted to singing, with the accompaniment of cithern playing; but flute playing, athletic contests, horse racing, contests in art and poetry were afterward introduced.

PYTHON

PYTHON, in Greek mythology, a celebrated serpent which destroyed the people and cattle about Delphi, and was slain by Apollo. In zoölogy, rock snake.

PYTHONESS, the priestess of the temple of Apollo at Delphi, who delivered the oracles of the god; hence, applied to any woman who pretended to foretell coming events.

PYX, the sacred vessel used in the Catholic Church to contain the consecrated eucharistic elements which are preserved after consecration, whether for the communion of the sick or for the adoration of the faithful in the churches. The pyx is usually made of some precious metal, and the interior is commonly lined with gold.

Q

Q, q, the 17th letter and the 13th consonant of the English alphabet, a consonant having only one sound, that of k or c. The name of the letter is said to be from French *queue*=a tail, the form being that of an O with a tail to it.

As an initial, Q represents the Latin Quintus in inscriptions or literature; in geometry, etc., it represents the Latin *quod* (=which), as Q. E. D.=*quod erat demonstrandum*=which was to be shown or proved; Q. E. F.=*quod erat faciendum*=which was to be done.

As a symbol, Q was formerly used for 500, and with a dash over it, for 500,000.

QUACKENBOS, JOHN DUNCAN, an American physician; born in New York, N. Y., April 22, 1848; was graduated at Columbia College in 1868 and at the College of Physicians and Surgeons in 1871; began practice in New York; became Adjunct Professor of the English Language and Literature at Columbia College in 1884; Professor of Rhetoric in Barnard College in 1891–1893. He then became a specialist in mental diseases and lectured extensively on scientific and literary topics. He wrote "History of the World"; "History of Ancient Literature"; "Tuberculosis"; "Magnhild" (1919), etc. A specialist in mental diseases.

QUACKENBUSH, STEPHEN PLATT, an American naval officer; born in Albany, N. Y., Jan. 23, 1823; joined the navy in 1840; promoted lieutenant-commander in 1862; had charge of various vessels in blockading fleets during the Civil War; participated in the action at Elizabeth City and Newbern, N. C., captured the "Princess Royal" and won distinction in other operations. He was retired with the rank of rear-admiral in 1885. He died in Washington, D. C., Feb. 4, 1890.

QUADER SANDSTONE, a siliceous sandstone of Cretaceous age, with many fossil shells identical with those of the English Chalk.

QUADRAGESIMA ("fortieth"), the Latin name for the whole season of Lent, with its 40 days, but the name is commonly assigned to the first Sunday in Lent.

QUADRANGLE, a square or four-sided court or space surrounded by buildings, as often seen in the buildings of a college, school, etc. In geometry, a figure having four angles, and consequently four sides.

QUADRANT, in architecture, the same as QUADRANGLE (*q. v.*). In geometry, the fourth part of a circle. Nautically, an instrument for making angular measurements. It is now superseded by the SEXTANT (*q. v.*)

QUADRATE BONE, in comparative anatomy, a bone by means of which the rami are articulated with the skull in birds, reptiles, and fishes (often called the hypotympanic bone).

QUADRATURE, the state of being quadrate or square; a square space. In astronomy, the position of one heavenly body with respect to another 90° distant, as the moon when midway between the points of opposition and conjunction. In geometry, the act of squaring; the reducing of a figure to a square. The quadrature of the circle is a famous problem, which has probably been the subject of more discussion and research than any other problem within the whole range of mathematical science.

QUADRATURES, METHODS OF, any arithmetical method of determining the area of a curve. When the exact area is known a square whose area is equal to it can be found—hence the term "quadratures." It has been shown (see CALCULUS) that the area of a curve whose equation is $y=f(x)$ is $fydx$, and can therefore be found when the integral can be evaluated. Hence the approximate determination of the value of a definite integral is obtainable by the method of quadratures.

QUADRIGÆ, in Roman antiquities, a two-wheeled car or chariot drawn by four horses, harnessed all abreast. In monumental work it is the figure, as thus described, surmounting an arch or main structure.

QUADRILATERAL, the name given in history to the four fortresses of north Italy—Mantua, Verona, Peschiera, and Legnago—which form a sort of outwork to the bastion of the mountains of the Tyrol, and divide the N. plain of the Po into two sections by a most powerful barrier.

QUADRILLE, a dance consisting of five figures or movements, executed by four sets of couples, each forming the side of a square. Also, the music composed for such a dance; and, a game of cards played by four persons with 40 cards, the tens, nines, and eights being thrown out from an ordinary pack.

QUADROON, or **QUARTERON**, a person who is one-quarter negro and three-quarters white; that is, one of whose grandparents was white and the other negro; and one of whose immediate parents was white and the other mulatto.

QUADRUMANA, in zoölogy, an order of mammalia, founded by Cuvier, and containing the monkeys, apes, baboons, and lemurs.

QUADRUPED, the name popularly applied to those higher vertebrate animals which possess four developed limbs. The name is usually restricted to four-footed mammals.

QUADRUPLE ALLIANCE, an alliance, so called from the number of the contracting parties, concluded in 1718 between Great Britain, France, and Austria, and acceded to by Holland in 1719, for the maintenance of the peace of Utrecht. The occasion of the alliance was the seizure by Spain of Sardinia in 1717, and Sicily in 1718, both of which she was forced to give up. Another quadruple alliance was that of Austria, Russia, Great Britain, and Prussia, in 1814, originating in the coalition which had effected the dissolution of the French empire.

QUÆSTOR, in Roman history, two *quæstores parricidii*, who acted as public prosecutors in cases of murder, or any capital offense, existed in Rome during the period of the kings. Two *quæstores classici*, who had charge of the public money, were first appointed about 485 B. C. The number was doubled B. C. 421, and it was decided that they should be chosen from the patricians and the plebeians. It was not, however, till 409 B. C. that a plebeian was elected. They also had charge of the funds of the army, to which they were paymasters. The number of quæstors was increased to eight 265 B. C. Sylla raised the number to 20, and Julius Cæsar to 40.

QUAGGA, *Equus* (*Asinus*, Gray) *quagga*, a striped equine form, from South Africa, now nearly extinct. Height at shoulders about four feet; striped only on head, neck, and shoulders; prevailing color brown; abdomen, legs, and part of tail whitish-gray.

QUAIL, the genus *Coturnix*, especially *C. communis*, or *dactylisonans*, the latter name having reference to the peculiar dactylic call of the male, which has given rise to the provincial name of wet-my-lips, wet-my-feet, from a supposed similarity of sound. It is widely distributed over the Eastern Hemi-

QUAIL

sphere, visiting Europe in early summer and returning S. in the autumn, when immense numbers are caught and fattened for the market, as their flesh is much esteemed. Length about seven inches, general color reddish-brown. They nest on the ground, laying from 9 to 15 pyriform yellowish-white eggs, blotched with dark-brown.

QUAIN, a family of eminent medical men. (1) JONES QUAIN, born in November, 1796, in Mallow, Ireland, studied medicine at Dublin and Paris, and in 1829 was appointed lecturer on anatomy and physiology in the Aldersgate School of Medicine, London. Two years later he was made Professor of Anatomy and Physiology at London Uni-

versity. He wrote Quain's "Elements of Anatomy." Jones Quain published also a series of elaborate "Anatomical Plates" (1858) and a translation of Martinet's "Pathology" (1835). He died in London, Jan. 27, 1865. (2) RICHARD QUAIN, brother of the above; born in Fermoy, Ireland, in July, 1800, studied at London, and was appointed Professor of Anatomy and Clinical Surgery in University College, London, in 1837. He was surgeon-extraordinary to the queen, and elected president of the Royal College of Surgeons in 1868. Among his works the principal are: "Anatomy of Arteries," with folio plates (1845); "Some Defects of Medical Education" (1870); he edited along with others the fifth edition of (Jones) "Quain's Anatomy." By his will he left nearly $375,000 to University College, London, for the "education in modern languages (especially English) and in natural science." He died in London on Sept. 15, 1887. (3) SIR RICHARD QUAIN, Bart., first cousin to both the above, was born in Mallow, Oct. 30, 1816. He was Lumleian lecturer at the Royal College of Physicians ("Diseases of the Muscular Walls of the Heart") in 1872, and Harveian orator ("The Healing Art in its Historic and Prophetic Aspects") in 1885, and was made physician extraordinary to the queen. He edited the "Dictionary of Medicine" (1883); and contributed to the "London Journal of Medicine," etc. Dr. Quain was made LL.D. of Edinburgh in 1889, president of the General Medical Council in 1891, was created a baronet in 1891, and died March 13, 1898. (4) SIR JOHN RICHARD QUAIN; born in Mallow in 1817, the half-brother of Jones and Richard Quain, was made a judge of the Court of Queen's Bench in 1872, and justice of the High Court of Judicature in 1875. He died Sept. 12, 1876.

QUAKING GRASS, *Briza*, a genus of grasses. The species are few and mostly European. They are all very beautiful. *B. maxima*, a native of the S. of Europe, is often planted in flower gardens. *B. media*, the only species common in Great Britain, growing in almost all kinds of poor soil, from the seacoast to an elevation of 1,500 feet, is of some value as a pasture grass, being very nutritious, although the quantity of herbage is scanty. The value of many poor pastures very much depends on it.

QUAMASH, the North American name of *Camassia esculenta*, a plant of the lily family with an edible bulb. These bulbs are much eaten by the Indians, and are prepared by baking in a hole dug in the ground, then pounding and drying them into cakes for future use.

QUANTITY, in grammar and prosody, the measure of a syllable or the time in which it is pronounced; the metrical value of syllables as regards length or weight in their pronunciation. In logic, the extent to which the predicate in a proposition is asserted of the subject.

In mathematics, anything that can be increased, diminished, and measured.

QUARANTINE, the period (originally 40 days) during which a ship coming from a port suspected of contagion, or having a contagious sickness on board, is forbidden intercourse with the place at which she arrives. Quarantine was first introduced at Venice in the 14th century. It is now required to be performed in almost every important country except Great Britain. By act of the United States Congress passed in 1879, National quarantine stations were established; and it is made a misdemeanor punishable by fine or imprisonment, or both, for the master, pilot, or owner of any vessel entering a port of the United States in violation of the act, or regulations framed under it. During the period of quarantine, all the goods, clothing, etc., that might be supposed capable of retaining infection, are subjected to a process of disinfection, which is a most important part of the quarantine system.

Quarantine has long been considered ineffective against the introduction of disease, besides being a source of much danger to those who were compulsorily detained under the system. The sanitary ideas of our day favor the safer methods used in England against cholera. The fate of quarantine in the British Islands was determined in 1894 when, in discussion on the Privy Council estimates objection was made to the cost of maintaining the quarantine establishment in the Solent on the ground of its uselessness, and the government promised to abolish the system. As a result the Public Health Act of 1896 was passed, by which yellow fever and the plague are to be dealt with in the same manner as cholera, and regulations made by the Local Government Board will apply equally to the three diseases.

In the United States, under the law of March 28, 1890, known as the Interstate Quarantine Act, the supervising surgeon-general of the Marine Hospital Service is charged with preparing the rules and regulations, under direction of the Secretary of the Treasury, necessary to prevent the introduction of certain contagious diseases from one State to another, and he has also supervision of the

medical inspection of alien immigrants, which, under the law of March 3, 1891, is conducted by the medical officers of the Marine Hospital Service. Under the act of Feb. 15, 1893, he is charged with the framing of regulations for the prevention of the introduction of contagious diseases and the prevention of their spread; and he is also charged with the conduct of the quarantine service of the United States. He has the direction of laboratories established to investigate the cause of contagious diseases, and publishes each week, under the title of "Public Health Reports," sanitary reports received from all parts of the United States and (through the State Department) from all foreign countries. See BUBONIC PLAGUE; CATTLE-PLAGUE.

QUARLES, FRANCIS, an English poet; born near Rumford, England, in 1592; was educated at Cambridge, and entered at Lincoln's Inn. In 1621 went to Dublin, where he became under-secretary to Archbishop Ussher. He was driven from Ireland, with the loss of his property, by the rebellion of 1641, and was appointed chronologer to the city of London. At the commencement of the civil wars he wrote a work entitled the "Loyal Convert," which gave offense to the Parliament. Of the works of Quarles, in prose and verse, the most celebrated is his "Emblems," a set of designs illustrated by verses. Among his poems are "Divine Poems," and "Argalus and Parthenia." His "Enchiridion" is a collection of brief essays and aphorisms. He died Sept. 8, 1644.

QUARNERO, GULF OF, in the Adriatic Sea, between Istria and the Croatian coast, 15 miles in length and breadth. It is nearly inclosed to the leeward by the islands of Cherso and Veglia, and communicates with the Adriatic by three channels.

QUARRY, a place, pit, or mine where stones are dug out of the earth, or are separated from the mass of rock by blasting. The term mine is generally confined to pits or places whence coal or metals are taken.

QUART, the fourth part of a gallon; two pints; the United States dry quart contains 67.20 cubic inches, the fluid quart 57.75 cubic inches; the English quart contains 69.3185 cubic inches.

QUARTER, a measure of weight, equal to the fourth part of a hundredweight—*i. e.*, to 28 pounds avoirdupois. As a measure of capacity, for measuring grain, etc., a quarter contains eight bushels.

QUARTER, that part of a ship's side which lies toward the stern, or which is comprehended between the aft-most end of the main chains and the sides of the stern. In heraldry, one of the divisions of a shield, when it is divided into four portions by horizontal and perpendicular lines meeting in the fesse point.

QUARTER DAY, in matters influenced by United States statutes quarter days are the 1st of January, April, July, and October. In the relation between landlord and tenant in some of the States they are the 1st of May, August, November, and February, respectively. In England it is the day which begins each quarter of the year. They are now Lady day (March 25), Midsummer day (June 24), Michaelmas day (September 29), and Christmas day (December 25).

QUARTER DECK, in nautical language, a deck raised above the waist and extending from the stern to the mainmast.

QUARTERMASTER, in military affairs, an officer who superintends the issue of stores, food, and clothing, and arranges transportation for a regiment when necessary. In nautical affairs, a petty officer, who, besides having charge of the stowage of ballast and provisions, coiling of ropes, etc., attends to the steering of the ship. He is appointed by the captain.

QUARTERMASTER-GENERAL, in the United States a staff-officer with rank of Brigadier-General. He is chief officer in the quartermaster's department. In England a staff-officer, specially appointed for duties connected with quartering, encamping, embarking, and moving troops. In both armies in the field he is responsible for the surveys and reconnaissance necessary for the conduct of the army, and has the general direction of the railways, postal, signaling, and telegraph services.

QUARTERN, a term sometimes used to designate the fourth of a peck, or of a stone; as the quartern loaf. In liquid measure it is the fourth part of a pint.

QUARTER SESSIONS, in England, a general court of criminal jurisdiction held in every county once in each quarter of a year before two or more justices of the peace, and before the recorder in boroughs. Its jurisdiction is confined to the smaller felonies and misdemeanors against the public, and certain matters rather of a civil than a criminal nature.

In Scotland, a court held by the justices of the peace four times a year at the county towns. These courts have the power of reversing the sentences pronounced at the special and petty ses-

sions, when the sentence is of a nature subject to review.

QUARTERSTAFF, a stout staff used as a weapon of offense or defense. It was generally about 6½ feet long, and loaded with iron at each end.

QUARTET, a piece of music arranged for four voices or instruments, in which all the parts are *obligati; i. e.*, no one can be omitted without injuring the proper effect of the composition. Quartets for stringed instruments are generally arranged for two violins, a cello, and violoncello.

QUARTO, name of the size of a book in which a sheet makes four leaves. Frequently abbreviated to 4to. Also a book formed by folding a sheet twice, making four leaves, eight pages. The term, by modern usage, refers to a book of nearly square form.

QUARTZ, in mineralogy, a rhombohedral or hexagonal mineral, crystallizing mostly in hexagonal prisms with pyramidal terminations. Quartz is abundantly distributed, is an essential constituent of many rocks, notably granite, gneiss, various schists, and constitutes the larger part of mineral veins. Many of its varieties are largely employed in jewelry.

QUARTZ ROCK, the name applied to all rocks consisting essentially of massive quartz.

QUASIMODO, in the Roman calendar, a term applied to the first Sunday after Easter, from the opening words of the introit for that day, "*quasi modo geniti infantes*"=as (infants) lately (born).

QUASSIA, in botany the typical genus of the order *Simarubaceæ*. *Q. amara* is a tree cultivated in the West Indies and the parts adjacent. In pathology, the Surinam quassia is *Q. amara;* Jamaica quassia, the wood of *Picræna excelsa*. It comes to this country in logs or billets, and is retailed as chips or raspings. It is given as an extract, an infusion, or a tincture, and acts as a pure bitter and stomachic, and as an antiperiodic.

QUATERNARY, or **POST-TERTIARY**, the fourth great division of the fossiliferous strata, which embraces the Pleistocene or Glacial and Post-glacial and Recent systems.

QUATERNION, in mathematics, the metrographic relation existing between any two right lines, having definite lengths and directions in space, depending on four irreducible geometrical elements.

QUATHLAMBA MOUNTAINS, a range in South Africa, forming the W. boundary of Zululand and Natal; also called the Drakensberg Mountains.

QUATRE-BRAS, a village of Belgium; about 10 miles S. S. E. of Waterloo; at the intersection of the great roads from Brussels to Charleroi, and from Nivelles to Namur, whence its name ("four arms"). On June 16, 1815, two days before the battle of Waterloo, Quatre-Bras was the scene of a desperate battle between the English under Wellington and the French under Ney. The honors of the field remained with the former; but the severe defeat of Blücher the same day at Ligny compelled Wellington to retreat. The loss on the English side was 5,200, on the French 4,140, among the allies being the Duke of Brunswick, the gallant chief of the Black Brunswickers. A monument to his memory, a bronze lion 10½ feet high, was erected in 1890.

QUATREFAGES, JEAN LOUIS ARMAND DE, a French naturalist; born in Berthezème, France, Feb. 10, 1810; studied medicine at Strassburg, and in 1838 was appointed Professor of Zoölogy at Toulouse. But this post he soon resigned and went to Paris. In 1850 he was elected Professor of Natural History in the "Lycée Napoléon," and in 1855 of Anatomy and Ethnology at the Natural History Museum in Paris. He devoted his attention principally to anthropology and the lower animals. His chief works are: "The Human Species" (1877); "Memoirs of a Naturalist" (1854); "Unity of the Human Species" (1861); "The Prussian Race" (1879); "The Pygmies" (1887); "Darwin and His French Forerunners" (1892); and "Transformist Theories" (1892). He died Jan. 13, 1892. See ANTHROPOLOGY.

QUATREFOIL, in architecture, a piercing or panel divided by cusps or foliations into four leaves, or more correctly the leaf-shaped figure formed by the cusps. The name is also given to flowers and leaves of a similar form carved as ornaments on moldings, etc. In heraldry, four-leaved grass; a frequent bearing in coat-armor.

QUATREMÈRE DE QUINCY, ANTOINE CHRYSOSTOME, a French archæologist; born in Paris, Oct. 28, 1755; held political offices under the republic, consulate, empire, and restoration, and in 1818 became Professor of Archæology in the Royal Library. His works include: "Dictionary of Architecture," "Imitation in the Fine Arts," and lives of Raphael, Canova, and Michael Angelo. He died Dec. 8, 1849.

SOUTHEASTERN PART OF
QUEBEC
SCALE OF MILES
0 10 20 30 40 50

Seven Islands
Moisie Bay
Moisie R.
Ore Pt.
Maple Pt.
LARGE I.
HUNTING I.
MINGAN IS.
Outardes Bay
Boshushibis Bay
Natashkwan R.
Natashkwan
St. Margaret B.
Great Boule
Island B.
Godbout
Godbout R.
Lobster Bay
English Bay
West Point
North Pt.
ANTICOSTI ISLAND
Ellis Bay
Charleston Pt.
Observation Bay
Bear B.
C. Henry
Joseph Pt.
St. Ann Cove
Southwest Pt.
Sandy Cove
Fox Bay
East Cape
Heath Pt.
Pt. Caribou
Trinity Bay
Riviere a la Martre
Riviere a Claude
Monte Louis
C. Meguatalon
Grande Vallee
C. Magdalen
Cap Chat
Capucins
Ste. Anne des Monts
Pt. de Monts
Mal Bay
Gaspe Basin
Pt. Fourneau
Pt. Peninsula
Pt. Jacques Cartier
Pt. St. Pierre
Pt. Forillon
Fame Point
Fox Cove
Griffon Cove
C. Rosier
Douglastown
C. Gaspe
Barachois
Pt. St. Peter
Mal Bay
Perce
BONAVENTURE I.
Cape Cove
C. d'Espoir
Grand River
Lit. Pabos
Grand Pabos
Newport
Maquereau Pt.
Port Daniel
Hopetown
Paspebiac
New Carlisle
Pt. Miscou
MISCOU I.
Chaleurs Bay
Dalhousie
Campbellton
Matapedia
Dawsonville
St. Alexis
Escuminac
Cross Point
Millstream
Cascapedia
New Richmond
Caplin
Carleton
Bonaventure
Bonaventure Pt.
Nouvelle
Maria
Causapscal
Matapedia R.
Metapedia R.
Restigouche R.
Upsalquitch R.
Tobique R.
Nictaux
Annapolis
Digby
Yarmouth
Shelburne
Liverpool
Lunenburg
Halifax
Truro
Pictou
New Glasgow
Amherst
Moncton
Sackville
Dorchester
Shediac
Cape Tormentine
Charlottetown
Summerside
Prince Edward Island
Cape Breton
Sydney
Glace Bay
New Waterford
Louisburg
Port Hawkesbury
Antigonish
Pictou
New Glasgow
Truro
Windsor
Kentville
Wolfville
Annapolis Royal
Digby
Yarmouth
Shelburne
Liverpool
Lunenburg
Halifax
Dartmouth

QUATROCENTO, a term applied to the characteristic style of the artists who practiced in the 14th century.

QUAVER, a shake or rapid vibration of the voice; a shake on an instrument of music. Also a note and measure of time, equal to half a crotchet or the eighth of a semibreve.

QUAY, a landing place; a wharf projecting into a stream, harbor, or basin, to which vessels are moored for the purpose of receiving and delivering freight.

QUAY, MATTHEW STANLEY, an American legislator; born in Dillsburg, Pa., Sept. 30, 1833; was graduated at Jefferson College, admitted to the bar in 1854; entered the Union army in 1861, was promoted lieutenant-colonel and assistant commissary general; received a congressional medal of honor for exceptional service; became State treasurer of Pennsylvania in 1885; and was a United States Senator in 1887–1899. Early in the latter year he was placed on trial on charges of misappropriation of public funds, and on April 21 was acquitted. Governor Stone appointed him United States Senator *ad interim*. In 1901 he was re-elected to the United States Senate. He died May 29, 1904.

QUEBEC, a province of the Dominion of Canada, formerly called Canada East; bounded on the N. by Labrador and Hudson Bay; on the E. by Labrador and the Gulf of St. Lawrence; on the S. by New Brunswick, Chaleurs Bay, Maine, New Hampshire, Vermont, and New York; on the S. W. and W. by the province of Ontario; gross area, 706,834 square miles; pop. about 2,500,000; capital, Quebec. The surface of the province is varied, being diversified by mountains, rivers, lakes, and extensive forests. The chief mountains are the Notre Dame or Shickshock Mountains, with peaks rising to the height of 4,000 feet; and the Laurentian Mountains, or Laurentides. The chief river is the St. Lawrence, which flows through the entire length of the province. Next to it in importance is its chief tributary, the Ottawa, over 700 miles in length. There are many beautiful lakes, the chief being Grand Lake, Temiscamangue, and Lake St. John.

Minerals.—Copper is mined in Brome and Megantic counties; gold in Beauce; iron ore in St. Maurice; and nickel in Pontiac. The other mineral productions include asbestos, apatite, plumbago, mica, slate-stone, etc.

Fisheries.—The total value of fish sold in 1917 was almost $3,000,000. The catch consisted principally of cod, mackerel, lobsters, salmon, and herring.

Agriculture.—About half of the population of Quebec is engaged in agriculture. The chief products include maize, buckwheat, tobacco, peas, turnips, barley, wheat, oats, potatoes, and hay. Spruce and pine are exported and the other forest products include ash, cedar, cherry, oak, elm, maple, birch, and beech. Cattle, horses, swine, and sheep are the principal domestic animals.

Government.—The affairs of the province are administered by a Lieutenant-General, appointed by the Governor-General of Canada, assisted by a responsible executive council. There are two Chambers, the Legislative Council, composed of 24 members who hold their appointments for life, and a Legislative Assembly, which has 81 members, elected by the people for five years.

Education.—The school system of Quebec provides for compulsory attendance between the ages of 5 and 16. There are three universities: McGill, Lennoxville, and Laval, and over 8,000 elementary and other schools. There is a total enrollment of about 500,000 pupils.

History.—Quebec was the earliest settled part of Canada. In 1534 Jacques Cartier explored Gaspé Peninsula and the Bay of Chaleurs, and in the following year he explored the St. Lawrence river as far as Montreal. The city of Quebec was founded by Champlain in 1608, who later established trading stations and forts at various places. The French governed Quebec till 1759, when General Wolfe won the battles of the Plains of Abraham, and the English gained control. Prior to 1841 Quebec was called Lower Canada, but in that year it was united to Upper Canada. It was made a province of the Dominion of Canada (*q. v.*) in 1867 by the Act of Confederation.

QUEBEC, a city and capital of the province of Quebec, Canada; at the confluence of the St. Lawrence and St. Charles rivers, and on the Grand Trunk, the Canadian Pacific, the Lake St. John, the Intercolonial, the Quebec Central, and other railroads; 180 miles N. E. of Montreal. The city is built amid beautiful scenery, for the most part on a narrow, elevated strip of land. It is divided into two parts, called the Upper and Lower Towns. The former is built on the highest part of the plateau and is surrounded with a wall and strongly protected in other ways. The latter, which is chiefly given to trade, occupies the base of Cape Diamond, the extreme point of the tableland. Here much of the rock has been cut away to make room for buildings. Owing to its im-

pregnable character Quebec has been called the Gibraltar of America.

The shipping of lumber is the principal industry. The chief exports, besides lumber, include iron castings, leather, boots and shoes, grain, peltries, musical instruments, nails, machinery, india-rubber goods, cutlery, steel, and rope. There is an abundant water supply from Lake St. Charles.

The principal buildings are the Parliament and Departmental buildings, city hall, custom house, court house, the Basilica, Masonic Hall, the Seminary of Quebec, Laval University (R. C.), Morrin College (Pres.), Ursuline Convent, Church of England, Female Orphan Asylum, St. Bridget's Asylum, the Ladies' Protestant Home, Jeffrey Hale Hospital, Marine Hospital, and the Gray Nunnery. The citadel of Quebec, built on the summit of Cape Diamond, at a height of 333 feet above the river, is said to be the most formidable fortification in North America. There is a beautiful monument to the memory of Wolfe and Montcalm, in the governor's garden which overlooks the St. Lawrence river. On the Plains of Abraham in the suburbs stands a monument to Wolfe, commemorating the victory of 1759.

The cite of Quebec, originally occupied by an Indian village named Stadacona, was discovered by Jacques Cartier in 1535; but the city was founded by Champlain in 1608. It continued to be the center of French trade and civilization, as well as of Roman Catholic missions in North America till 1759, when it fell into the hands of Great Britain by the victory of Wolfe on the Heights of Abraham above the city. Quebec remained the chief city of Canada till the British settlements in the West were erected into a separate province, when it became the capital of Canada East, now forming the province of Quebec. Pop. about 120,000.

QUEBRACHO, in botany, *Aspidosperma quebracho*, a Chilean apocynaceous tree; its bark is used as a febrifuge and in lung or bronchial diseases. It is called also white quebracho, to distinguish it from the red quebracho, a Mexican tree.

QUEDAH, or **KEDAH**, a state on the W. side of the Malay Peninsula, with an area of 3,600 square miles. Pop. about 250,000, nominally subject to Siam. The capital, from which the state takes its name, has a population of about 30,000.

QUEDLINBURG, a town of Prussia, at the N. base of the Harz Mountains; 56 miles S. E. of Brunswick. Founded by Henry the Fowler in 924, it is still in part surrounded by a wall flanked with towers. On an eminence overlooking the town stands the castle, which prior to the Reformation was the residence of the abbesses of Quedlinburg. The town has manufactures of sugar, wire goods, and farinaceous foods. Pop. about 27,500.

QUEEN ADELAIDE ARCHIPELAGO, a group of islands, belonging to Chile; N. of the W. entrance of the Strait of Magellan; separated by Smyth Channel from King William Land on the mainland.

QUEEN ANNE'S BOUNTY, the name given to a fund appropriated to increase the income of the poorer clergy of England, created out of the first fruits and tenths, which before the Reformation formed part of the papal exactions from the clergy.

QUEEN BEE, in entomology, a fully developed female bee in a hive or nest. She lays 2,000 or 3,000 eggs daily during the height of summer, or more than 1,000,000 during her lifetime, which is about five years. See BEE.

QUEEN CHARLOTTE ISLANDS, a group to the N. of Vancouver Island, off the coast of British Columbia; area, 5,100 square miles. The two principal islands, Graham and Moresby, have a length of 160 and a greatest breadth of nearly 70 miles. The climate is healthy, but very rainy. Anthracite coal, copper and iron ore, and gold bearing quartz have been found, and forests abound. The inhabitants are about 2,000 Indians, who engage in fishing.

QUEEN'S BOROUGH. See NEW YORK.

QUEEN'S COLLEGE, for women, was established in London, in 1848, and incorporated by royal charter in 1853. Its aim is to provide for the higher education of women, in the first place by a liberal school training, and subsequently by a six years' course of college education.

QUEENSLAND, since 1901 an Australian state, comprising the whole N. E. portion of Australia N. of New South Wales and E. of South Australia and its Northern Territory, being elsewhere bounded by the Gulf of Carpentaria, Torres Strait, and the Pacific. A considerable portion is thus within the tropics, the extreme N. part forming a sort of peninsula, known as York Peninsula. It has an area of 670,500 square miles; pop. about 715,000.

Topography.—Toward the W. a large portion of the surface is dry and barren, but toward the E., and for a long stretch along the coast, boundless plains or downs, admirably adapted for sheep walks. The highest mountains are near the coast, the greatest elevation being

about 5,400 feet. The principal rivers are the Brisbane, the Burnett, the Pioneer, the Fitzroy, and the Burdekin flowing into the Pacific, and the Flinders and Mitchell into the Gulf of Carpentaria. In the N. part the climate is tropical. The rainfall in the interior is scanty and variable; the mean at Brisbane is about 35 inches. The indigenous animals and plants are similar to those of the rest of Australia. Crocodiles inhabit some of the N. rivers.

Productions.—There are many kinds of valuable timber trees, and a rare thing in Australia, a few good indigenous fruits. Sheep farming is the chief industry, but agriculture (including sugar-growing), cattle rearing, and mining are also important. The soil and climate are well suited for the production of all the ordinary cereals, as well as maize, tobacco, coffee, sugar, cotton, etc. The chief products are sugar, maize, English and sweet potatoes, arrow root, and semi-tropical fruits. Sugar growing is becoming a very important industry. Gold, tin, lead, and copper are the principal minerals.

In the N. pearl fishing is actively carried on. The manufacturers are unimportant. The principal manufactories, or works that may be classed as such, are sugar mills, steam sawmills, soap works, agricultural implement works, and distilleries. The staple articles of export to the United Kingdom are wool, tallow, and preserved meats.

Education and Religion.—Education is free and secular in the public schools, and is under a special department controlled by the minister for education. A university was established at Brisbane in 1911.

History.—The first settlement of Queensland took place in 1825, when the territory was used as a place of transportation for convicts, who continued to be sent there till 1839. In 1842 the country was opened to free settlers. It was originally a part of New South Wales, and was organized as a separate colony in 1859. The government of the colony is vested in a governor, who is the crown's representative, and a Parliament of two houses, the legislative council and the legislative assembly. The capital of the colony is Brisbane; pop. about 180,000. In January, 1896, a disastrous flood caused great loss of life and property in Brisbane and northern Queensland.

QUEEN'S METAL, an alloy used for making teapots, obtained by fusing under charcoal a mixture of nine parts tin, one part each antimony, lead, and bismuth.

QUEEN'S PIGEON, a magnificent ground pigeon inhabiting the islands of the Indian Ocean, named after Queen Victoria.

QUEEN'S or KING'S SPEECH, a document prepared by the advisers (*i. e.*, the cabinet) of the sovereign and read by him or her from the throne in the House of Lords, or in his or her absence by the lord chancellor, at the opening and closing of each session of Parliament, in which are set forth the general relations of the empire and the measures the ministers intend to bring forward.

QUEENSTOWN, a seaport of Ireland; on the S. side of Great Island; in the harbor of Cork, 12 miles S. E. of Cork, and 177 S. W. of Dublin. Its original name was Cove of Cork; the present name commemorates the visit of Queen Victoria in 1849. Pop. about 8,500.

QUEEN'S YELLOW, the yellow subsulphate of mercury, used as a pigment.

QUELPART, an island 60 miles off the S. coast of Korea; about 40 miles long by 17 broad. It is rock-bound and mountainous, the volcanic Mount Auckland being 6,500 feet high. It has fertile soil and good timber, and is populous.

QUERÉTARO, capital of State of Querétaro (area, 4,493 square miles; pop. about 250,000), Mexico, on the tableland 112 miles N. E. of Mexico City. Its buildings include a magnificent cathedral, State palace, city hall, ornate theater and bull ring. Streets are handsome, with large plazas and gardens. Industries include cotton mills, and mining. Cattle breeding is carried on throughout the district and State, and in the valleys agriculture is highly developed. Pop. about 35,000.

QUERN, a mill, especially a hand mill for grinding corn, used before the invention of water or windmills.

QUESNEL, PASQUIER, a French theologian; born in Paris, France, July 14, 1634. After a distinguished course in the Sorbonne, he entered the Congregation of the Oratory in 1657. At the age of 28 he was appointed director of the Paris house of his congregation. It was for the use of the young men under his care that he commenced the celebrated series "Moral Reflexions on the New Testament." In 1675 he published an edition of the works of Leo the Great, which in the notes was held to maintain Gallicanism, and was accordingly placed on the "Index." Having refused to subscribe the formulary condemnatory of

Jansenism required from all members of the Oratory, Quesnel was compelled to flee to the Low Countries. He continued at Brussels his "Reflexions," which were published in a complete form. The Jesuits were unceasing in their hostility, and Quesnel was denounced and flung into prison, but escaped to Holland. He died Dec. 2, 1719.

QUETTA, known locally as SHALKOT, a town near the N. frontier of Baluchistan, strategically important as commanding the Bolan Pass and the Pishin valley. Since 1877 Quetta and its district have been administered by British officers, the headquarters of a considerable military force, and is strongly fortified. The valley is fertile, well watered, and populous. Coal and petroleum were discovered in 1890.

QUETZALCOATL, the god of the air of the ancient Mexicans, who presided over commerce and the useful arts, and is said to have predicted the coming of the Spaniards to Mexico.

QUEVEDO Y VILLEGAS, DON FRANCISCO DE, a Spanish poet and prose writer; born in Madrid, Spain, in 1580. His prose works are mostly effusions of humor and satire. His "Visions" (Sueños) have been translated into most European languages. He died in 1645.

QUEZAL, a most beautiful Central American bird of the Trogon family (*Trogon* or *Calurus resplendens*). It is about the size of a magpie, and the male is adorned with tail feathers from 3 to 3½ feet in length, and of a gorgeous emerald color. The back, head, and throat are of the same color; the lower part of the chest is vivid scarlet. The female lacks these long feathers, and is otherwise much plainer. The food of the quezal consists chiefly of fruits.

QUIBERON, a small fishing-town of France, in the department of Morbihan; at the extremity of a long narrow peninsula, 21 miles S. W. of Vannes. It was here that a body of French emigrant royalists landed from an English fleet in 1795, and endeavored to rouse the people of Brittany and La Vendée against the Convention, but were defeated and driven into the sea by General Hoche. On Nov. 20, 1759, Hawke completely defeated a French fleet under Admiral Conflans in Quiberon Bay. Pop. about 3,500.

QUICHUA, the name of a native race of South America, inhabiting Peru, parts of Ecuador, Bolivia, etc. With the Aymaras the Quichuas composed the larger portion of the population of the empire of the Incas. The Quichua language, which was formerly the state language of the Incas, is still the chief speech of Peru, of a large portion of Bolivia, of the part of Eucador bordering upon Peru, and of the N. section of the Argentine Republic.

QUICKLIME, lime in a caustic state; calcium oxide deprived by heat of its carbon dioxide and water. This is extensively done in lime kilns, the fuel used being faggots, brushwood, or coal. The firewood and lime to be calcined are mixed. Quicklime treated with water evolves much heat, and falls into a thick paste. Lime thus slaked and mixed with sand constitutes mortar.

QUICKSAND, in its usual significance, a tract of sand which, without differing much in appearance from the shore of which it forms part, remains permanently saturated with water to such an extent that it cannot support any weight. Quicksands are most often found near the mouths of large rivers. They appear only to be formed on flat shores, the substratum of which is an irregular expanse of stiff clay or other impervious formation. Pools of water are retained in the hollows, and become partially filled with sand or mud, which remains like the soft sediment in a cup of cocoa on account of the absence of drainage. The sand on a uniform shelving shore consolidates at low tide because the water which permeates it drains back freely to the sea. In narrow channels through which the configuration of the adjoining shore causes strong tidal currents to run the sand may be kept so constantly stirred up by the moving water that a quicksand results. Thus, while the summit of a sandbank rising from a gentle slope is usually firm, the hollow margin of the bank where it meets the shore is frequently a quicksand.

Quicksand, when examined under the microscope, will be seen to have rounded corners like river sand, as distinguished from angular or "sharp" sand, which will pack more solidly than the other. It is quicksand that is used in the hourglass and in the smaller egg-boiler.

Quicksands are not commonly of great extent, and their danger has probably been exaggerated in the popular mind by sensational descriptions in works of fiction. The name quicksand is sometimes applied to the drifting sands which are carried by wind over cultivated land bordering the seashore or a desert.

QUICKSILVER. See MERCURY.

QUIETISM, the doctrine that the essence of true religion consists in the withdrawal of the soul from external and

finite objects, and its quiet concentration upon God. It is a form of mysticism, and has been held by individuals in the Church in all ages. In the 14th century it attracted notice in connection with the Hesychasts of the Greek Church. The term was specially used to describe the views advocated by Miguel de Molinos, a Spanish priest, who settled at Rome in 1669 or 1670. In 1676 he published his "Spiritual Guide," which was soon afterward translated into Italian, French, Latin, and English. On Aug. 28, 1687, the Inquisition condemned 68 propositions in his writings, and on November 20 he was imprisoned for life, and died Dec. 28, 1697. It was believed that the Quietist doctrine tended to disparage the external observances of religion and substitute the authority of the individual for that of the Church. In another direction, also, quietism in some cases tends to antinomianism.

QUILEUTE, a tribe of North American Indians, who formerly lived on a river of the same name, in the State of Washington. Their numbers were gradually reduced by wars with other tribes and the few remaining are found in the Neah Bay reservation in Washington.

QUILIMANE, a seaport of East Africa, in the Portuguese territory of Mozambique, about 15 miles from the mouth of the river of the same name. The town occupies an unhealthy site. Exports, ivory, ground nuts, india-rubber, wax, copal, and oil-seeds.

QUILL, or **QUILLE**, in ornithology, the larger and stronger feathers of the wing. They are of three kinds: primaries, secondaries, and tertiaries. In music, a small piece of quill attached to a piece of wood, by means of which certain stringed instruments, as the virginal, were played. In seal engraving, the hollow mandrel of the lathe or engine used by the seal engraver. In weaving, a small spindle, pirn, or rod upon which thread is wound to supply the shuttle with the woof, weft, or filling, as it is variously called, and which crosses the warp, or chain.

QUILLAIA, QUILLAJA, or **QUILLAYA**, large evergreen trees. Three or four species are known; all from South America. *Q. saponaria* is the Quillai or Cullay. Also the bark of the *Q. saponaria*. It is used as a source of saponin, which is extracted with alcohol.

QUILLER-COUCH, SIR ARTHUR THOMAS, an English writer of fiction; born in Cornwall, Nov. 21, 1863. He was educated at Oxford. He belonged to the staff of the weekly "Speaker." Among his stories are: "Dead Man's Rock"; "The Astonishing History of Troy Town"; "The Splendid Spur"; "The Blue Pavilions"; "The Ship of Stars," etc. He completed Robert Louis Stevenson's unfinished novel "St. Ives." Among his more recent works are: "Poison Island" (1907); "Corporal Sam" (1910); "Nicky Nan" (1915), etc. Knighted in 1910. Since 1912, Professor of English Literature, Cambridge University.

QUILOA, or **KILWA**, a seaport of East Africa, in former German territory, 190 miles S. of Zanzibar, and an outlet for the trade with Nyassaland, exports ivory, gum copal, rice, and manioc.

QUILTING, a method of sewing two pieces of silk, linen, or stuff on each other, with wool or cotton between them, by working them all over in the form of chequer or diamond work, or in flowers.

QUIMPER, a town of France, in the department of Finistère, on the Odet, 11 miles from its mouth, and 63 miles S. E. of Brest. Its cathedral (1239–1515), a stately and richly-carved and ornamental edifice, is the principal building. Potteries are in operation, as well as tanyards, sailworks, etc. Pop. about 20,000.

QUIN, JAMES, an English actor, of Irish parentage; born in London, England, Feb. 24, 1693. He made his first appearance on the stage at Dublin in 1714; shortly afterward he obtained an engagement in London, and gradually acquired celebrity as a tragic actor as well as in comic characters. He retained his pre-eminence till the appearance of Garrick in 1741. His last performance was Falstaff (1753), in which character he is supposed never to have been excelled. He died Jan. 21, 1766.

QUINCE, the fruit of *Cydonia vulgaris*, or the tree itself. It is 15 or 20 feet high, with white or pale-red flowers, and ultimately golden fruit. It is indigenous in the S. of Europe, the N. of Africa, the Himalayas, etc. The fruit is used in the preparation of marmalade, jelly, and preserves. Its mucilaginous seeds are given by the natives of India in diarrhœa, dysentery, sore throat and fever. The Japan quince is a small tree about six feet high.

QUINCY, a city and county-seat of Adams co., Ill.; on the Mississippi river, and on the Wabash, the Burlington Route, and the Quincy, Omaha, and Kansas City railroads; 104 miles W. of Springfield. Here are the St. Francis Solanus College (R. C.), Chaddock College (M. E.), Gem City and Union business colleges, St. Mary's Institute (R.

C.), public library, Blessing and St. Mary's Hospitals, State Soldiers' and Sailors' Home, residence of a Protestant Episcopal bishop, parks, waterworks, street railroad and electric light plants, National, State and private banks, and several daily and weekly periodicals. There is daily steamboat connection with cities along the Mississippi river. Quincy has flouring mills, carriage factories, machine shops, foundries, saw mills, planing mills, and extensive manufactures of cigars, tobacco, sash, blinds, stoves, elevators, pumps, furniture, bricks, steam engines, plows, etc. A magnificent railroad bridge crosses the river here. Pop. (1910) 36,587; (1920) 35,978.

QUINCY, a city in Norfolk co., Mass.; at the mouth of the Quincy river where it enters Quincy Bay, and on the New York, New Haven, and Hartford railroad; 8 miles S. E. of Boston. It comprises nearly a dozen villages. Here are the Adams Academy for Boys, Woodward Institute for Girls, Thomas Crane Public Library, city hospital, waterworks, electric street railroads, electric lights, National, co-operative, and savings banks, and daily and weekly newspapers. The city contains quarries of the celebrated Quincy granite, which is shipped to nearly all parts of the United States. It also has a large boot and shoe industry. Quincy is noted as the birthplace of John Hancock, of John Adams and John Quincy Adams, Presidents of the United States. Pop. (1910) 32,642; (1920) 47,611.

QUINCY, JOSIAH, sometimes called JOSIAH QUINCY, JR., an American lawyer; born in Boston, Mass., Jan, 23, 1744. He graduated from Harvard in 1763. He joined with John Adams in defending the British soldiers in the Boston Massacre case. But he took part in the town meeting ordering the "Boston tea-party"; and in September, 1774, went to England to speak in behalf of the colonists. His best-known works are: "An Address of the Merchants, Traders, and Freeholders of Boston" in favor of a non-importation act (1770), and "Observations on the Boston Port Bill" (1774). He died April 26, 1775.

QUINCY, JOSIAH, an American author and orator; born in Boston, Mass., Feb. 4, 1772, son of Josiah Quincy. He was graduated at Harvard College in 1790, studied law, and entered Congress in 1805, where he distinguished himself as a favorite orator in opposition to the policy of Jefferson and Madison, and was one of the earliest to denounce slavery. He became a member of the Senate of Massachusetts, and in 1822, judge of the Municipal Court of Boston. In 1823 he was elected mayor of Boston; and in 1829 accepted the post of president of Harvard College, which he held till 1845. Among his published works are a "History of Harvard University" (1840); "The Municipal History of the Town and City of Boston" (1852); "Life of John Quincy Adams" (1858); "Essays on the Soiling of Cattle" (1859). He died in Quincy, Mass., July 1, 1864.

QUINET, EDGAR, a French historian and philosopher; born near Bourg, France, Feb. 17, 1803. His works fill nearly 30 volumes, of which only a small part has any permanent value. He was appointed Professor of Foreign Literatures at Lyons, and afterward at the Collège de France in Paris. His principles were strongly republican, and brought him into trouble more than once. His leading works are: "Ahasuerus" (1834); "Merlin the Enchanter" (1861); "The Revolution" (1865); and "The Creation" (1869). He also wrote several long poems. He died in Versailles, March 27, 1875.

QUININE, in chemistry, $C_{20}H_{24}N_2O_2$, chinin or quinia; the most important alkaloid of the true cinchona barks, first obtained, but in an impure state, by Gomez, of Lisbon, in 1811.

QUININE SULPHATES, the neutral or common medicinal sulphate, $2C_{20}H_{24}N_2O_2{\cdot}H_2SO_4{+}8H_2O$; prepared by the neutralizing quinine with dilute sulphuric acid. Quinine sulphate is largely employed as a febrifuge and tonic, and it possesses powerful antiseptic properties.

QUINOA, *Chenopodium Quinoa*, a valuable food-plant, a native of Chile and the high table-land of Mexico, which much resembles some of the British species of *Chenopodium*. In the countries in which it is indigenous it is much cultivated for its seeds, which form a principal food of the inhabitants. It is sometimes cultivated in British gardens for its leaves, which are a good substitute for spinach.

QUINOLINE, a pungent colorless liquid obtained by the distillation of bones, coal tar, and various alkaloids.

QUINQUAGESIMA SUNDAY, the Sunday next before Lent, being about 50 days before Easter.

QUINQUEREMES, vessels with five banks of oars, however arranged; may be regarded as the first-rates of the ancient navies.

QUINSY, or **QUINANCY**, inflammatory sore throat. There is swelling of one tonsil, or of both, attended with dif-

ficulty of breathing and swallowing, and febrile symptoms.

QUINTAL, a weight of 100 or 112 pounds, according to the scale used. The French *quintal metrique* is 100 kilogrammes or 220.46 pounds avoirdupois.

QUINTANA, MANUEL JOSÉ, a Spanish poet; born in Madrid, Spain, April 11, 1772; was lawyer, journalist, and man of letters, as well as poet. He was governor or preceptor to the young Queen Isabella, was made senator and peer in 1835. He was a Liberal in politics, and twice driven from office, being imprisoned from 1814 to 1820. His most famous work is the "Lives of Celebrated Spaniards," in three volumes (1807–1833). He died March 11, 1857.

QUINTANA ROO, a federal state of Mexico, in the peninsula of Yucatan, bounded on the W. by the state of Campeche, on the N. by the state of Yucatan, on the E. by the Caribbean Sea, and on the S. by British Honduras. Puerto Morelos, Chansantacruz and Santa Cruz de Bravo are the chief towns, the last being the capital. Its area is 19,270 square miles. It was organized as a territory in 1902, and was from that time on administered directly by the government from the city of Mexico. Pop. about 10,000.

QUINTETTE, or **QUINTET**, in music: (1) A composition in five parts or for five performers. (2) Part of a movement sung by five voices *soli*, opposed to *coro*. (3) A composition for two violins, two tenors, and a violoncello; or two violins, a tenor, and two violoncellos; or two violins, a tenor, a violoncello, and double bass, having the same form as a sonata.

QUINTILIAN, QUINTILIANUS MARCUS FABIUS, a Roman rhetorician; native of Spain. In his early youth he was at Rome, and heard the lectures of Domitius Afer, who died A. D. 59. He accompanied Gabba to Rome, in the year 68, became an eminent pleader, and still more eminent as a teacher of rhetoric. He taught at Rome for 20 years, was named preceptor to the grandnephews of Domitian, had also Pliny the younger among his scholars. He retired from his public duties in 89, and is supposed to have lived about 30 years longer. His great work is entitled, "On Oratory as an Art."

QUINTILIUS, AURELIUS CLAUDIUS, brother of Claudius II., was, on his death, invested with the purple by the army in Aquitaine, A. D. 270, but being deserted by his troops on the approach of the rival Emperor Aurelian, who had been proclaimed by the Italian army, he bled himself to death in a bath 17 days after assuming the scepter.

QUIRE, a collection of 24 sheets of paper. Wrapping, envelope, flat-cap, printing, and many other papers are not folded. News paper has 25 sheets to the quire. Also a collection of one of each of the sheets of a book laid in consecutive order ready for folding.

QUIRINAL, THE, one of the seven hills of ancient Rome, and next to the Palatine and Capitoline, the oldest and most famous quarter of the city.

QUIRINUS, among the Romans, a surname of Romulus after he had been raised to the rank of a divinity. Hence Quirinalia, a festival in honor of Romulus, held annually on the 13th day before the kalends of March, that is, February 17.

QUIRITES, a designation of the citizens of ancient Rome as in their civil capacity. The name of Quirites belonged to them in addition to that of Romani, the latter designation applying to them in their political and military capacity.

QUIRK, in architecture and carpentry: (1) A sudden turn, applied to a form of molding in which an acute recess separates the molding proper from the fillet or soffit. It is much used between moldings in Gothic architecture; in Grecian, and sometimes in Roman, architecture ovolos and ogees are usually quirked at the top. (2) A projecting fillet on the sole or side of a grooving plane, which acts as a fence or a gauge for depth or distance. (3) A piece taken out of any regular ground-plot or floor, so as to make a court, yard, etc.; thus, if the ground plan were square or oblong, and a piece were taken out of the corner, such piece is called a quirk.

QUIT-CLAIM, a deed of release; an instrument by which some claim, right, or title, real or supposed, to an estate, is relinquished to another without any covenant or warranty, express or implied.

QUITMAN, JOHN ANTHONY, an American military officer; born in Rhinebeck, N. Y., Sept. 1, 1799. He began his career by teaching school from his 16th to his 19th year, when he commenced the study of law. Removing to Mississippi in 1821, he entered the political arena, filling successively the offices of member of the Legislature, State chancellor, member of the convention for revising the State constitution, State Senator, and governor, which latter he entered on through a vacancy in 1836. He soon

after withdrew from political life, and joined the Texans in their struggle for independence. In 1846 he was appointed Brigadier-General of the United States army in the war with Mexico, distinguishing himself at Monterey, Vera Cruz, and Cerro Gordo, after which latter engagement he was brevetted Major-General, and was voted a sword by Congress for gallantry. He participated in the attack on Chapultepec, and was foremost in the assault on the City of Mexico, which city he governed till order was established. He was elected governor of Mississippi soon afterward, but resigned in consequence of accusations of complicity with the Lopez-Cuban expedition, of which charge, however, he was acquitted. In 1855 and 1857, he was elected to Congress by large majorities. He died in Natchez, Miss., July 17, 1858.

QUITO, a city and capital of the republic of Ecuador; on the E. slope of the W. branch of the equatorial Andes; 150 miles from Guayaquil. The volcanic mountain of Pichincha is the basis on which it rests. In the principal square stand the cathedral, the episcopal palace; the town house, and the palace of the Audience. Manufactures include coarse cotton and woolen goods, hosiery, lace, jewelry, and confectionery. It has a trade in agricultural produce, and exports iron, steel, and indigo. The great danger of Quito is from earthquakes, and from the vicinity of burning mountains, which often break out into the most tremendous eruptions. On Feb. 4, 1797, 40,000 lives were lost. The height of Quito above the level of the sea is 9,534 feet. Pop. about 70,000.

QUIT-RENT, rent paid by the freeholders and copyholders of a manor in discharge or acquittance of other services.

QUOIN, a wedge-shaped block. Specifically, in gunnery, a wedge-shaped block of wood, having a handle inserted in its thicker extremity; used in some cases for giving the proper elevation to guns. In printing, one of the wedges by which the pages or columns of type are locked in a chase, ready for printing. Nautically, a wedge used as a chock in stowing casks, to prevent rolling. In masonry, an external angle of a wall; particularly an ashlar or brick corner projecting beyond the general faces of the walls which meet at the angle. Rustic quoins are rusticated ashlars forming external projecting corners, the remainder of the wall being of ordinary masonry, rubble, or brick, with occasional piers of masonry.

QUOITS, a game played with a flattish ring of iron, generally from 8¼ to 9½ inches in external diameter, and between one and two inches in breadth. It is convex on the upper side and slightly concave on the under side, so that the outer edge curves downward, and is sharp enough to cut into soft ground.

QUORUM, in Old English law, those justices of the peace whose presence is necessary to constitute a bench. Also such a number of officers or members of a body as is competent by law or constitution to transact business.

QUOT, in Scotch law, one-twentieth part of the movable estate of a person dying in Scotland, anciently due to the bishop of the diocese in which he resided.

QUO WARRANTO, in law, a writ issuing against any person or corporation that usurps any office or franchise, to inquire by what authority he or it supports his or its claim, in order to determine the right.

R

R, r, the 18th letter and the 14th consonant of the English language, is classed as a semi-vowel and a liquid. It is also called a trill. It is generally considered to have two sounds: The first, when it begins a word or syllable, and when it is preceded by a consonant, being then produced by an expulsion of vocalized breath, as in ran, tree, morose, etc.; the second, less decidedly consonantal, heard at the end of words and syllables, and when it is followed by a consonant, being formed by a vibration of the lower part of the tongue, as in her, star, beard, etc. In Scotch and some dialects, r has always the same sound, being uttered with a strong vibration of the tongue, but less guttural than in French or German. By the Romans r was called the "dogs' letter," from its sound resembling the snarling of dogs. In words derived from the Greek we follow the custom of the Romans, who represented the aspirated sound with which r was pronounced by the Greeks, by rh, as in rhapsody, rhetoric, etc. In such words, however, the h has no influence on the pronunciation of the English word, and is, therefore, entirely superfluous. R and l are frequently interchanged (see remarks under L).

As an initial, R represents the Latin *rex*=king, as George R.=George, king; or *regina*=queen, as Victoria R.=Victoria, queen. It also represents English royal, as R. N.=Royal Navy, R. A.=Royal Artillery. In astronomy it stands for right, as R. A.=Right Ascension; in proper names, for Richard, Robert, etc.; in monumental inscriptions, for *requiescat*, as R. I. P.=*requiescat in pace*=may he (or she) rest in peace; in Biblical literature for revised, as R. V.=revised version. As a symbol, R was formerly used to stand for 80, and with a dash over it, for 80,000. In medicine, R stands for Latin recipe=take. The three R's, a humorous and familiar designation for the three elementary subjects of education: reading, writing and arithmetic.

RA (more properly **RE**), the name of the god of the sun among the ancient Egyptians. He is represented, like Horus, with the head of a hawk, and bearing the disk of the sun on his head.

RAASAY, one of the Inner Hebrides, lies between the isle of Skye and the mainland of Scotland, and belongs to Inverness-shire. It is 13 miles in length from N. to S., 3½ miles in greatest breadth, and 24 square miles in area. The W. side of the island is bare and uninteresting. On the E. and more sheltered side there is some striking scenery. Dun Caan (1,456 feet) is the highest point, and Brochel Castle, on the E. shore—now a mere ruin—the chief object of interest.

RABAT, or **NEW SALLEE,** a seaport of Morocco, on the S. side of the Bu-Ragreb, at its entrance into the Atlantic. It stands on cliffs in the midst of gardens, and is overlooked by a large citadel. The most conspicuous object is, however, the tower of Beni-Hassan (180 feet high), near it is the ruined mosque of Almanzor. Carpets, shoes and mats are made, and woolens dyed. Formerly it was the center of the European trade with Morocco; it still exports olive oil, grain, hides, flax, wool, maize, and millet. Pop. (1917) 37,548.

RABBI, in Jewish history and literature, rabbi is the noun *Rab* with the pronominal suffix, and in Biblical Hebrew= great man, distinguished for age, rank, office or skill. In post-Biblical Hebrew it is used as a title indicating sundry degrees by its several terminations. Thus, the simple term Rab=teacher, master, and was the title which Babylonion Jews gave to a doctor of the law.

RABBIT, the *Lepus cuniculus,* a well-known burrowing rodent, with a very wide geographical range. It probably had its home in the W. portion of the Mediterranean basin, but has spread over western Europe, Great Britain,

Ireland, Australia, New Zealand, and America. The rabbit is smaller than the hare; its muzzle is slenderer, and the palate larger and narrower. They begin to breed at 6 months old, and have several litters in each year. They are domesticated throughout France and form an important article of food.

RABELAIS, FRANÇOIS, a French satirist; born in Chinon, Touraine, about 1483. He was at first a monk, but having been punished for some indecorous

FRANÇOIS RABELAIS

behavior, he quitted the Benedictine order, studied medicine at Montpellier, and for a time practiced as a physician. He subsequently obtained the rectory of Meudon. He was author of several books; but the only one by which he is known is the romance called "The Lives, Heroic Deeds, and Sayings of Gargantua and Pantagruel," an extravagant satire upon monks, priests, popes, and pedants, in which much obscenity and absurdity are blended with learning, wit, and humor. Rabelais was a conscientious teacher of his flock, his purse always open to the needy, and his medical skill was employed in the service of his parish. He died in 1553.

RABIES. See HYDROPHOBIA.

RACCOON, or **RACOON**, the genus *Procyon* and especially *P. lotor*, a handsome animal, about the size of a large cat, brown furry hair; tail bushy and ringed; body large and unwieldy, legs short, feet with strong fossorial claws. It is omnivorous and ranges over a large part of North America, where it is hunted for its fur. The crab-eating raccoon (*P. cancrivorus*), from South America, ranging as far N. as Panama, differs chiefly from the former in the shortness of its fur, and consequent slender shape.

RACCOON DOG, in zoölogy, the *Nyctereutes procyonides*, somewhat resembling a raccoon in appearance. Also, any dog trained to chase or hunt raccoons, for which task peculiar sagacity is necessary in the dog in order to preserve himself from injury.

RACCOON RIVER, a stream in Iowa, rises in Buena Vista co., runs S. E., intersects Sac, Carroll, Greene, and Dallas counties, and enters Des Moines river at the city of Des Moines. Its length is estimated at 170 miles.

RACE, a class of individuals sprung from a common stock; the descendants collectively of a common ancestor; a family, tribe, nation, or people belonging, or supposed to belong, to the same stock.

The human family, according to Blumenbach, comprises five distinct races of men, viz.: The Caucasian, or white race, inhabiting southwestern Asia, the greater part of Europe, large portions of North and South America, and Australia; the Ethiopian, black or negro race, occupying tropical and South Africa, some of the Pacific islands, part of Australia, and portions of North America, into which they were originally brought as slaves; the Mongolian, or yellow race, occupying northern and eastern Asia; the Malayan, or brown race, inhabiting the islands of the Indian and Pacific Oceans, the Australian continent, and the Malay Peninsula; and the American Indian, or red race, of North and South America.

RACCOON

RACEME, in botany, a kind of inflorescence, in which the flowers are on simple stalks distinct from each other, and arranged around a common axis.

RACEMOSE GLANDS, glands in which the secreting cavity is made up of a number of smaller lobules.

RACHEL, the second daughter of Laban, the dearly beloved of Jacob, who, to obtain her, devoted seven years to the flocks and herds of her father. But, at

the end of that period, he found in his veiled bride not Rachel, but Leah, her elder sister, whom he did not love, and was obliged to labor during seven more years in order to gain Rachel. She was the mother of Joseph and Benjamin.

RACHEL, ELIZA RACHEL FÉLIX, a French actress; born in Mumpf, Switzerland, Feb. 28, 1820; was the daughter of a Jew peddler, and in 1830 went to reside at Paris. Sarah, her elder sister, used to sing at the various cafés. In 1832, the voices of the two sisters having attracted notice, they were placed, by the kindness of some connoisseurs, under Choron, a celebrated singing-master; and in 1833, the younger sister Rachel, having shown great tragic power, entered the Conservatoire at Paris, and in 1838 made her first appearance at the Théâtre Français, in the character of Camille, in "Le Horace," where her début was not auspicious. In the course of a few months Mademoiselle Rachel completely revived the classic school of tragedy which had fallen into decay, though her crowning triumph was gained in 1843, in her representation of "Phèdre." Soon after this she made a provincial tour, visited the chief European cities, and at last came to London, in 1846, reaping fame and wealth wherever she appeared. In 1855 she made a professional visit to the United States, interrupted by the failure of her health, returned to France, and died of consumption in Cannes, near Toulon, Jan. 3, 1858.

RACHIS (rā'kĭs), in botany, a branch which proceeds nearly in a straight line from the base to the apex of the inflorescence of a plant. The term is also applied to the stalk of the frond in ferns, and to the common stalk bearing the alternate spikelets in some grasses.

RACHITIS, a term which properly implies inflammation of the spine, but it is applied to the disease called rickets, which term suggested this as the scien tific name.

RACHMANINOV, SERGEI V., a Russian pianist and composer. Born in the province of Novgorod in 1873, at nine years of age he entered the St. Petersburg Conservatory. When he graduated from the Moscow Conservatory in 1893 he produced his first opera "Aleko." For ten years, 1893–1903 he taught in the Moscow Girls' Institute, and from 1904-1906 was the conductor of the Moscow Imperial Theater. For the next few years he traveled in Europe and America giving recitals, but finally settled in Dresden where he devoted himself exclusively to creative work. He has written two operas in addition to the one already mentioned, "The Niggardly Knight" and "Francesca da Rimini." He has composed a great deal of piano music, several cantatas, two symphonies, and a symphonic poem, "The Isle of Death."

RACINE, a city and county-seat of Racine co., Wis.; on Lake Michigan at the mouth of Root river, and on the Chicago, Milwaukee, and St. Paul, and the Chicago and Northwestern railroads; 23 miles S. of Milwaukee. Here are Luther College, Racine College, Racine Academy, the Racine Home School, St. Catherine's Academy (R. C.), high school, Taylor Orphan Asylum, St. Luke's Hospital, waterworks, electric light and street railroad plants, many churches, a number of National and State banks, and several daily, weekly, and monthly periodicals. The harbor is one of the best on the lake, and is accessible by vessels drawing 14 feet of water. Racine has manufactories of agricultural implements, carriages, leather, iron castings, lumber, etc. Pop. (1910) 38,002; (1920) 58,593.

JEAN RACINE

RACINE, JEAN, an eminent French dramatic poet; born in La Ferté Milon, France, Dec. 22, 1639, and was educated at Port Royal. In 1664 he produced his tragedy of "La Thébaïde," which was followed in 1665 by "Alexandre." In 1667 appeared his "Andromaque," which placed him far above all his contemporaries except Corneille; and his fame was still further increased by the production of "Britannicus," "Bérénice," and other tragedies. In 1677 appeared his tragedy of "Phèdre." He wrote, by desire of Louis XIV. and Madame de Maintenon, the sacred dramas of "Esther" and "Athalie." Besides his dra-

matic works, he wrote "Canticles and Hymns for the use of St. Cyr," the "History of Port Royal," etc. In 1673 he was received into the academy, and continued to enjoy the highest favor at court; but having offended the king by a too free use of his pen in drawing up a memorial on the distresses of the people, he lost favor. He died April 21, 1699.

RACK, an apparatus for the judicial torture of criminals or suspected persons. It consisted of a large, open, wooden frame, within which the person to be tortured was laid on his back on the floor, with his wrists and ankles fastened by cords to two rollers at the end of the frame. These rollers were then drawn or moved in opposite directions till the body rose to a level with the frame. Interrogations were then put, and if the prisoner refused to answer, or if his answers were not considered satisfactory, the rollers were further moved, until at last the bones of the sufferer were forced from their sockets.

In gearing, a toothed bar whose pitch line is straight, adapted to work into the teeth of a wheel for the purpose of changing rectilinear into circular motion, or vice versa. This contrivance is called a rack-and-pinion, and the motion so imparted rack-and-pinion motion. In horology, a steel piece in the striking part of a clock. In lace, a certain length of lace-work counted perpendicularly, and containing 240 meshes. In metallurgy, an inclined frame or table, open at the foot, and upon which metalliferous slimes are placed and exposed to a stream of water, which washes off the lighter portions. Nautically, (1) A frame of wood with belaying-pins, or a row of blocks for fair-leaders, or a row of sheaves for reeving the running-rigging. (2) A frame with holes for round shot. (3) A box in which the halyards are coiled away.

RACKET, the instrument with which players at tennis or rackets strike the ball; a bat, consisting of an elliptical loop formed of a thin strip of wood, across which network of cord or gut is stretched, and to which a handle is attached. Also a snow-shoe of cords stretched across a long and narrow frame of light wood; and a broad shoe or pattern made of wood, used on a man or a horse to support him on the surface of boggy ground. In ornithology, a spatule.

RACKHAM, ARTHUR, an English water-color painter and illustrator. Born in 1867, he received his early training at the Lambeth Art School. After making several successful drawings he undertook to illustrate several books, chiefly those dealing with the American, English, and German legends and folk stories. He has contributed illustrations for the following works: "Alice in Wonderland," "Midsummer Night's Dream," "Rip Van Winkle," "Grimm's Fairy Tales," Dickens' "Christmas Carol."

RACQUETS, a game played in a prepared court, open or close, with a small hard ball and a bat like that used for playing tennis. The closed or roofed court is now generally preferred for playing in. It is an oblong, rectangular area, 80 feet long and 40 broad when of full dimensions, and having high walls. The floor is divided into two chief areas of unequal size by a line, called the "short line," drawn across it at two-fifths of the length of the court from the back wall, the smaller area being again divided into two equal parts by a line at right angles to this, and two small areas being marked off in the other space next the short-line, called "service spaces." Two horizontal lines are also drawn across the front wall, one 2 feet 2 inches above the floor, below which if the ball strike it is out of play, the other, the "cut line," 7 feet 9 inches above the floor. The game may be played with either one or two persons on each side. It is decided by lot which side goes in first, and the first player assumes which side of the court he pleases (usually the right), while the other stands in the opposite corner. The first player then begins to "serve," which consists in striking the ball with the bat so as to make it strike the front wall above the cut line, and then rebound into the opposite corner. If the ball is properly served the second player must strike it before it has made a second bound, so that it strikes the front wall above the lower line; but in returning the ball in this manner the player may if he likes first make it strike either of the side walls. The player may also return it before it touches the floor. The first player then returns the ball in the same way, and this goes on until either player fails. If it is the first player who fails, it is then the turn of the second player to serve. If it is the second player, the first scores one (an ace), and continues to serve, but goes to the opposite side of the court. In general 15 is the game.

RADCLIFFE, ANN, an English novelist whose maiden name was Ward; born in London, England, July 9, 1746. Her first performance was a romantic tale, entitled "The Castles of Athlin and Dunbayne"; which was succeeded by "The Sicilian Romance" and "The Romance of

the Forest"; but that which made her reputation was the "Mysteries of Udolpho." She died in London, Feb. 7, 1823.

RADCLIFFE COLLEGE, an educational non-sectarian institution in Cambridge, Mass., for women; founded in 1879; reported at the close of 1919: Professors and instructors, 128; students, 561; president, L. R. Briggs, LL. D.

RADETZKY, JOSEPH WENZEL, COUNT, an Austrian general; born in the castle of Trebnitz, in Bohemia, Nov. 2, 1766. Called to participate in the long struggle against Napoleon, and having won his way to the rank of Major-General, he fought at Agram and Erlingen; distinguished himself in the battles of 1813, 1814, and 1815; and at Kulm, Leipsic, and Brienne. Having been successively governor of Ofen in Hungary, and Lemberg in Poland, he was, in 1822, appointed commander-general of the Lombardo-Venetian kingdom. In 1848 the people of Milan rose against their Austrian oppressors, and after a gallant struggle drove them out of the city. Radetzky retreated upon Verona, to await the arrival of re-enforcements. Shortly afterward, Charles Albert, King of Sardinia, joined the popular cause, but was defeated at Novara. This battle decided the fate of the Italian cause, and Austrian tyranny was again triumphant in Lombardo-Venetia. After 73 years of service in the Austrian armies, Radetzky resigned in the year 1857. He died in Milan, Italy, Jan. 5, 1858.

RADHANPUR, chief town of a protected state in Bombay presidency, India, 150 miles N. W. of Baroda. It is surrounded with walls and incloses a fortified castle, the residence of the native prince. The state of Radhanpur has an area of 1,150 square miles. Pop. about 100,000.

RADIANT, in botany, diverging from a common center, like rays. In heraldry an epithet applied to an ordinary or charge, when it is presented edged with rays or beams; rayonnant; reyonnée. In astronomy, the point in the heavens from which a star shower seems to proceed. In geometry, a straight line proceeding from a given point or fixed pole, about which it is conceived to revolve. In optics, the luminous body or point from which rays of light falling on a lens or mirror diverge.

RADIATA, in zoölogy, a term introduced by Cuvier, in 1812, for the lowest of his great groups or embranchments. He described them as having radial instead of bilateral symmetry, apparently destitute of nervous system and sense organs, having the circulatory system rudimentary or absent, and respiratory organs on or coextensive with the surface of the body; and included the Echinodermata, Acalepha, Entozoa, Polypi, and Infusoria. Wider knowledge led to the narrowing of the limits of this group, and through Agassiz pleaded for its retention (with the three classes of Polypi, Acalephæ, and the Echinoderms). Huxley's "Lectures on Comparative Anatomy" finally broke up what is called the "radiate mob" and distributed its constituents among the Echinodermata, Polyzoa, Vermes, Cœlenterata, and Protozoa.

RADIATION, in physics, the transmission of heat, light, or actinic power (hence known as forms of "radiant energy") from one body to another without raising the temperature of the intervening medium. It takes place in all directions around a body. In a homogeneous medium it takes place in straight lines. Radiation proceeds *in vacuo* as well as through air. Its intensity is proportioned to the temperature of the source, and it diminishes according to the obliquity of the rays with respect to the radiant surface, and the radiating or emissive power of a body, or its capability of emitting at the same temperature, and with the same extent of surface, greater or less quantities of heat. The energy received from a radiating body is inversely proportional to the square of the distance, and the radiation of a body is exactly proportional to its absorbing power. If the radiating power of lampblack be reckoned at 100, that of platinum foil is 10.80; copper foil, 4.90; gold leaf, 4.28, and pure laminated silver 3.80. Solar radiation is the radiation from the sun; terrestrial radiation that from the earth into space.

RADICAL, in chemistry, a group of elements common to a more or less numerous series of allied compounds, and unaffected by the processes whereby these compounds are transformed one into another, *e. g.*, Ethyl (C_2H_5), the radical of common alcohol (C_2H_5HO). In mathematics, an indicated root of an imperfect power of the degree indicated. In philology, (1) A radix, root, or simple underived, uncompounded word. (2) A letter which belongs to the root; a primitive letter. In English and American politics, an ultra-liberal, verging on Socialism; one of that party in the state which desires to carry out a radical reform of the constitution, and to give greater power to the democracy. The term was first used in England and applied as a party name in 1818 to Henry Hunt, Major Cartwright, and others of

the same party, who wished to introduce radical reforms in the representative system.

RADICALISM, signifying, in a political sense, those elements which demand extreme reform measures in government organization. The term was first applied to the Radical party of Great Britain, in 1819, which stood opposed to the conservative Tories, demanding universal suffrage and an extension of the rights of the people. In this country the Progressive party corresponded most nearly to a radical party. Socialists are also generally known as radicals, but generally speaking a radical does not demand a change in the basic laws of the nation, which a Socialist does, for which reason the latter is more properly a revolutionist, even though he does not desire to bring about the changes by force of arms.

RADIOACTIVITY, the phenomenon shown by certain substances of emitting radiation spontaneously. First observed in 1896 by Henri Becquerel, who found that certain uranium salts emitted rays which were capable of affecting a photograph plate through black paper or thin metallic sheets, and were also able to discharge electrified bodies and to produce phosphorescence. Becquerel's discovery was followed in 1898 by those of Schmidt and Madam Curie, who found almost simultaneously that thorium salts also emit rays. Madame Curie, working with her husband, discovered, in the same year, that pitchblende contained in addition to uranium, two radioactive elements, which were named polonium and radium. In the following year, 1899, Debierne discovered actinium in the same mineral.

In addition to radiations, Rutherford found that radioactive substances give off gases which are themselves temporarily radioactive. These gases are known as emanations. The emanations from actinium lose their activity very quickly, those from thorium more slowly, while those from radium retain their activity about six thousand times as long as those from actinium. By boiling the solution of a radioactive salt, all the emanations contained in it can be removed, but the de-emanated salt gradually regains its power of producing emanations. The emanations behave, in every way, as ordinary gases, and can be liquefied by cooling to very low temperatures. The rays emitted are of three kinds, and are known as the **A**, **B**, and **Γ** rays. They are capable of passing through opaque substances, but their penetrating power varies greatly. **A** rays are positively charged and have very small penetrating power; **B** rays are negatively charged and have greater penetrating power than the **A** rays, but are easily absorbed in comparison with the **Γ** rays, which have no electric charge, but are very penetrating. According to Rutherford, a piece of aluminum 8 cm. thick is required to cut off half the **Γ** rays, whereas a sheet 0.05 cm. thick will cut off the **B** rays and 0.0005 cm. the **A** rays, but these figures must be accepted with reserve, as rays from different elements possess varying penetrating ability. Crooks discovered that when the **A** rays are allowed to impinge upon a screen of zinc sulphide, the fluorescence produced is not a continuous glow but a succession of tiny sparks. An instrument in which this phenomenon is demonstrated is known as the spintharioscope.

Madame Curie and Laborde found that radium is always at a temperature above that of surrounding bodies, and it is stated that every hour it generates sufficient heat to raise its own weight of water from freezing to the boiling point. As much energy could be obtained from one gram of radium as from a ton of coal, but since approximately 2500 years would be required for the complete disintegration of the radium, the fact appears to have no practical significance. At present there is no known method of increasing the speed of this disintegration, but in view of the fact that the existence of the phenomenon of radioactivity has been known for scarcely a quarter of a century, it is too soon even to hazard a guess as to the possibilities of its practical application.

RADIOGRAPH, a picture of an object or objects obtained by means of the Roentgen rays instead of light rays; called also skiagraph.

RADIOLARIA, in zoölogy, according to E. Ray Lankester, a class of Protozoa, consisting of Gymnomyxa in which the protoplasmic body of the dominant amœba phase has the form of a sphere or cone, and incloses a spherical or cone-shaped perforated shell of membranous consistence, known as the central capsule, and probably homologous with the perforated shell of a Globigerina.

RADIOMETER, an instrument that is used for taking the altitudes of the celestial bodies. Also an instrument invented by Crookes for measuring the mechanical effect of radiant energy, and exhibited by him at the Royal Society, April 7, 1875. It resembles a miniature anemometer, and revolves by the action of light. The cups of the anemometer are replaced by disks, colored white on one side and black on the other, and the

instrument is inclosed in a glass globe from which the air has been exhausted, so that no heat is transmitted. When the disks are exposed to light, revolution begins and its speed is governed by the intensity of the light. Two candles produce twice the effect of one, and the flame of magnesium wire makes the disks spin with great rapidity.

RADIOPHONE, a word that applies to any invention that transmits or produces sound by means of radiant energy, particularly a device similar to the photophone, whose receiver is a block of vulcanite, with no telephone, the vibratory contraction and expansion being produced by the heat of the beam while vibrating, which is accompanied by an audible sound.

RADISH, the *Raphanus sativus*, the garden radish. It was cultivated in ancient times in India, whence it found its way to Europe and the United States.

RADIUM, an element recently discovered combined with polonium. Radium was discovered in 1903 by M. and Mme. Curie of Paris. It is worth from $100,000 to $200,000 an ounce. It throws out heat, light, and energy without loss of intensity, and without waste or diminution. Its principal practical use thus far has been in medical science for cure of cancer and restoration of eyesight.

RADIUM THERAPY, the use of radium for the cure of disease. It is still in the experimental stage, but sufficient success has already been gained to indicate that it may prove of great value in connection with certain malignant growths. The rays are applied by various methods: in some cases a tiny emanator tube is buried in the growth, in others the emanation is condensed in vaseline, oil, glycerine, or water and applied externally; or, again, the rays are condensed on arsenic, bismuth or quinine and taken internally. Another method of external application is to coat linen, or copper plates with a varnish containing radioactive salts, these being applied to the affected parts, the surrounding flesh protected with lead foil.

It is sometimes found that treatment with the rays will produce temporary improvement, but that complete cure does not take place. This is particularly the case with epitheliomas of the mouth and pharynx and laryngeal mucous membranes. Considerable success has been obtained in treating cancer of the uterus. After prolonged treatment amounting to as much as 60 hours spread over a period of five to ten days, there has followed a decrease in pain, the arrest of hemorrhage and discharge, and a healing of ulcerations. Similar success has attended treatment of carcinoma of the rectum, and cancer of the breast. In some instances of the latter, there has been apparently complete cure, and in the case of rodent ulcer apparent cure has resulted from a single treatment. In a report made by the Radium Institute of London (1917) it is stated that of 169 cases of rodent ulcer, 122 were cured and 37 were improved. Favorable results are also reported in the treatment of lympho sarcoma, in many cases the growth steadily shrinking and finally disappearing completely, while some success has been obtained with fibroid disease of the uterus, lupus vulgarus and pruritis arthritis.

A method of treatment developed in the United States has given good results in the treatment of cancer of the bladder and prostate. A gold needle, four to six inches long, containing radium in the point, is thrust into the center of the growth, and left there for some hours, local anæsthetics being used to deaden the pain of application. In nearly all cases after such applications there is a period of reaction which may last several months. Birthmarks and scars have been beneficially treated by radium emanations. It must, however, be emphasized that in spite of much real or apparent success, radium therapy is in its early stages and there is a general agreement that the only reliable treatment for malignant growths is removal by operation, and that treatment by radium should only be resorted to in those cases where surgical operation is impossible or inadvisable.

RADIUS, in anatomy, the outer of the two bones of the forearm. In botany, and plural form, the peduncles supporting the partial umbels in an umbellifer. In fortification, a line drawn from the center of the polygon to the end of the outer side. In geometry, the distance from the center of a circle to any point of the circumference.

RADIUS VECTOR, in astronomy, an imaginary line joining the center of a heavenly body to that of any second one revolving around it. In geometry, a straight line, or the length of such line, connecting any point, as of a curve, with a fixed point or pole, round which it resolves, and to which it serves to refer the successive points of a curve in a system of polar co-ordinates.

RADIX, in algebra, the root of a finite expression from which a series is derived. In anatomy, the root or portion of anything inserted into another, as the root of a tooth. In botany, the root

of any plant. In pharmacy, the root of a medicinal plant, as *Rhei radix*=rhubarb root. In mathematics, any number which is arbitrarily made the fundamental number or base of any system. Thus 10 is the radix of the decimal system of numeration, and also in Briggs' or the common system of logarithms.

RADNORSHIRE, a county of Wales, Great Britain, almost in the center of the principality. Very mountainous, save in the S. E., where agricultural products abound with considerable market gardening. Radnor forest is an interesting natural feature, being over 2,000 feet high. There are several rivers, the largest being the Wye, which separates the county on the S. from Brecknock. Capital, Radnor. Pop. about 20,000.

RADOM, a town of Poland, sixty miles S. of Warsaw. The city and its environs was the scene of heavy fighting during the German drive for Warsaw, in 1916, and, with Warsaw, fell into the hands of the Germans, where it remained until the retirement of the German armies from Poland, after the conclusion of hostilities. Pop. about 50,000.

RADOSLAVOV, VASILE, a Bulgarian statesman, born in Bulgaria in 1850; educated in Germany; returned home and entered politics, becoming leader of the anti-Russian Liberal party. Having once served as Minister of the Interior, King Ferdinand, at the outbreak of the World War, in 1914, appointed Radoslavov Premier, on account of his well known sympathy toward Austria and Germany. It was Radoslavov, one of the wiliest politicians of the Balkans, who guided the policy of Bulgaria in her double dealing with the Allies, until ready to throw her lot in with the Central Empires, in the fall of 1915, when a treacherous attack was made on the Serbians, while they were defending themselves against the Austro-German invasion. On the collapse of the Bulgarian front in Macedonia, Radoslavov was dismissed from office and sent into retirement.

RADOWITZ, JOSEPH VON, a Prussian statesman; born in Blankenburg, Feb. 6, 1797; entered the Westphalian army in 1813. After the peace of 1815 he taught in the military school of Cassel; but in 1823 he entered the Prussian service, and in 1830 became chief of the general staff of artillery. In 1836 Radowitz was sent as Prussian military commissioner to the German Diet at Frankfort, and held diplomatic posts. He was the confidant and adviser of King Frederick William IV. After the revolution of 1848 the endeavors of Prussia to give a constitution to Germany, by means of the alliance of the three kings, was principally his work. He wrote several works, mainly political, and died Dec. 25, 1853.

RADZIVIL, or **RADZIWILL**, the name of an ancient Polish family of Lithuania, which commenced to figure in history in the 14th century. Nicholas Radzivil, the first of the name, was created by Jagellon, Grand-Duke of Lithuania, palatine of Wilna. The most celebrated of his descendants were: NICHOLAS, palatine of Wilna and governor of Livonia, under Sigismund Augustus, King of Poland. He signalized himself by his valor against the Teutonic order in 1557, and against the Russians, whom, in 1565, he completely defeated. He abjured the Catholic for the Protestant religion. Born about 1500. He died in 1567. CHARLES RADZIVIL, palatine of Wilna. Nominated, in 1762, governor of Lithuania, by Augustus III., King of Poland, he energetically combated Russian influence; but, not succeeding in preventing the dismemberment of his native country, he went into exile. He died in 1790.

RAEBURN, SIR HENRY, a Scotch painter; born in Edinburgh, Scotland, March 4, 1756. Bound apprentice to a goldsmith, he was no sooner free than he devoted himself to portrait painting. In 1787, he established himself in Edinburgh, and soon rose to the head of his profession in Scotland. He was knighted by George IV., in 1822, and died in Edinburgh, July 8, 1823.

RAFF, JOACHIM, a German composer; born in Lachen, on Lake Zurich, May 27, 1822. He began life as a schoolmaster, but encouraged by Mendelssohn, he devoted himself to music. From 1850 to 1856 he lived near Liszt in Weimar, then taught music as Wiesbaden till 1877; and from that year till his death, June 24, 1882, he was director of the musical conservatory at Frankfort-on-Main. He published more than 200 musical productions. The symphonies "Leonore" and "In the Forest" are reputed his best works.

RAFFLES, SIR THOMAS STAMFORD, an English naturalist; born at sea, July 5, 1781. He entered the East India Company's civil service, and in 1811, on the reduction of Java by the British, he was made lieutenant-governor of the island. In this post he continued till 1816, when he returned to England with an extensive collection of the productions, etc., of the Eastern Archipelago. The year following appeared his "History of Java." Having been appointed to the lieutenant-governorship of

Bencoolen, Sumatra, he went out in 1818 to fill this post; founded the settlement of Singapore, and returned to Europe in 1824. He died July 5, 1826.

RAFFLESIA, named after Sir Thomas Stamford Raffles, the typical genus of *Rafflesiaceæ*. The first and finest species discovered was *R. arnoldi*, found by Raffles and Dr. Arnold in Sumatra in 1818. The flower (there is no stem) is more than a yard across.

RAFFLESIACEÆ, rafflesiads; an order of rhizogens. Stemless plants, having flowers immersed among scales, and growing directly from the surface of leaves. Perianth globose or campanulate, superior, limb five-parted, the throat surrounded by calli either distinct or constituting a ring. Column salver-shaped, or globose, with a row of anthers one or many-celled. Ovary inferior, one-celled, with parietal placentæ, and many seeds; fruit indehiscent. Parasites from the East Indies and South America. Known genera five, species 16.

RAFT, a sort of float or framework, consisting of logs or other pieces of timber fastened together side by side, for convenience in transporting them down rivers, across harbors, etc. Also a floating structure made and used in the emergency of shipwreck. Rafts are made of materials usually accessible on shipboard, spars lashed together by ropes, the flotative power being increased by empty casks lashed in the structure. When made and furnished as a part of a ship's equipment they are constructed with pontoons, and provided with stanchions and ropes, which form a protection against persons falling or being washed overboard. Such a raft is carried in a collapsed condition for compact stowage, and is more readily launched in that less bulky condition; after it is in the water it is brought into working shape by the purchases. Also a large collection of timber and fallen trees, which, floating down the great rivers of the western United States are arrested in their downward course by flats or shallow places, where they accumulate, and sometimes block up the river for miles.

RAFTER, in building, one of the pieces of timber which follow the slope of the roof, and to which are secured the laths into which the shingle or slate nails are driven. Rafters, though all performing the same general duty, have specific names according to their particular functions; as hip-rafter, jack-rafter, etc.

RAGATZ, a spa of Switzerland, in the S. E. corner of the canton of St. Gall, 68 miles S. E. of Zurich and 13 N. by W. of Chur (Coire), at the mouth of the ravine leading to Pfäfers, from which town it gets its healing waters by means of a pipe (1838–1840) 2½ miles long. Schelling, the German philosopher, is buried in the parish churchyard.

RAGEE, or **RAGGEE**, an Indian grain (*Eleusine coracana*), very prolific, but probably the least nutritious of all grains. In the form of cake or porridge it is the staple food of the poorer classes in Mysore and of the Neilgherries.

RAGGED SCHOOLS, a name applied to institutions founded during the 19th century for the moral reclamation and Christian instruction of the juvenile and adult necessitous poor in England.

RAGHUVANSA, a great Sanskrit epic, attributed to Kálidása. The subject is similar to that of the "Rámáyana," but begins with an account of Ráma's ancestors, "the family of Raghu," an ancient King of Ayodhya (Oudh). The text, with a Latin translation, was published by Stenzler (Lond. 1832).

RAGLAN, FITZROY SOMERSET, LORD, a British military officer; born Sept. 30, 1788. He was the son of the 5th Duke of Beaufort. He joined the 4th Light Dragoons at the age of 16, went with the troops to Portugal, and fought in all the great Peninsular battles, winning the notice and strong regard of the Duke of Wellington, who made him first his aide-de-camp, and then his military secretary. At Waterloo he lost his right arm. On the death of the Duke of Wellington, Raglan was appointed Master-General of the Ordnance, and, at the outbreak of the war between France, England, and Russia, he was selected to take the command of the forces ordered to proceed to the Crimea, commanded at the battles of the Alma, Balaklava, and Inkermann, and was promoted to the rank of field-marshal. Grief at the unsuccessful attack on the Malakoff and the Redan, and the loss of life which it entailed, preyed on his mind. He died in 1855.

RAGOUT, a dish of meat stewed and highly seasoned.

RAGSTONE, in geology, a rough siliceous rock, breaking into rag-like fragments. It is well adapted for sharpening steel instruments.

RAGTIME, syncopated music, having its origin among the colored people of the Southern States and enjoying great vogue in vaudeville and dance halls. Its characteristics are achieved by exaggerated noise and strongly marked accents

imitative of the effect produced by the elementary musical instruments in use among the natives of Africa.

RAGUSA, a city of Dalmatia; on the E. shore of the Adriatic, 100 miles S. E. of Spalato and opposite the Gulf of Manfredonia in Italy. It is surrounded with strong walls, and contains several striking and interesting buildings, chief among them being the palace of the rectors in the Gothic and Classic Renaissance styles between 1435 and 1464; the custom house and mint, dating from before 1312; the Dominican church (1306) and monastery (1348), the former containing a picture by Titian, the Franciscan church and monastery (1317); the Church of St. Biagio (Blaise), the patron saint of the town, built in 1348–1352, rebuilt in 1715; and the churches of San Salvatore and Alle Dancé.

The city seems to have been colonized by refugees from Epidaurus, Salona, and other Græco-Roman towns destroyed by the Slav invaders of the Balkan peninsula. For some centuries Ragusa was a Roman outpost on the edge of the Slav states, and flourished greatly under the suzerain protection of Byzantium. Toward the end of the 12th century Ragusa was made to acknowledge the supremacy of Venice. In 1358 Venice ceded her Dalmatian possessions to Hungary, and from that time down to the era of the Napoleonic wars Ragusa was generally accustomed to look to Hungary (*i. e.*, the German empire) for help against her enemies, though from the beginning of the 15th century she was a free and independent republic. Ragusa took a prominent place among the trading states of the Mediterranean, due to her position between the Christian powers and the empire of the Turks, and the privileges she enjoyed of trading freely with the subjects of the Sultan. Her "argosies" (*i. e.*, "vessels of Ragusa": see ARGOSY) traded as far as the Baltic. Ragusa was the home from the middle of the 15th century of a remarkable literary movement, stimulated by the Renaissance (see SERBIA). During the course of the Napoleonic wars the French entered the city in 1805; this led the Russians to bombard the place. But in 1808 Napoleon declared the republic of Ragusa to be at an end, and in the following year incorporated it in the kingdom of Illyria. Since 1814, like the rest of the Dalmatian seaboard, it has belonged to Austria. Ragusa had, however, long before this declined from her former greatness. Pop. about 15,000.

RAGWORT, the *Senecio jacobæa*, producing yellow flowers. Common by roadsides and in pastures.

RAHU, in Indian mythology, the demon who is imagined to be the cause of the eclipses of sun and moon.

RAHWAY, a city in Union co., N. J.; on the Rahway river, and on the Pennsylvania railroad, 19 miles S. W. of New York. The city has a public library, high school, about 20 churches, several banks, and a number of weekly newspapers. It has manufactures of railroad signals, carriages, printing presses, hubs and spokes, clothing, and shoes, a large printing and bookbinding establishment. Pop. (1910) 9,337; (1920) 11,042.

RAIAN MŒRIS, a lake basin, or ancient storage reservoir, in the Fayûm, Middle Egypt. It is long since dried up, but the statements of Herodotus, Strabo, and others show that the Nile has been regulated by utilizing a depression in the desert corresponding in shape and situation to the Raïan basin. A proposal to reconstruct this reservoir, by means of which an immense area might be brought under irrigation, engages attention. See MŒRIS, LAKE.

RAIATEA, one of the Society Islands in southeastern Polynesia; area, 75 square miles. Exports cotton and copra. Pop. about 23,000.

RAI BARELI, or **RAI BAREILLY**, a town and district of India; 48 miles S. E. of Lucknow; has a large brick fort (15th century), a magnificent palace and tomb of a former ruler, and some fine mosques. Pop. town (1911), 18,798. The district is part of the province of Oudh and Agra. Area, 1,751 square miles. Pop. about 1,100,000.

RAIIDAE, the family of fishes to which the rays (skate, etc.) belong. See RAY.

RAIKES, ROBERT, an English philanthropist, the originator of Sunday-schools; born in Glouceter, England, Sept. 14, 1735. His father was printer and proprietor of the "Gloucester Journal," and he succeeded to the business, keeping it till 1802. His pity for the misery and ignorance of many of the children in his native city led him, about 1780, to start a school where they might be taught to read and to repeat the Catechism. Raikes lived to see his schools widely spread over England. He died April 5, 1811.

RAIL, the common name of the *Rallidæ*, a family of grallatorial birds comprehending the rails proper (*Rallus*), the coots, water-hens, and crakes. Most of the members of the family are aquatic or frequent marshes; but some, as the crakes, frequent dry situations. The principal species of the genus *Rallus* are

the water rail of Europe (*R. aquaticus*), about 11 inches in length, of an olive brown color, marked with black above, and of a bluish-ash color beneath, with white transverse markings on the belly, much esteemed for the table; the Virginian rail of the United States (*R. virginianus*), somewhat smaller than the water rail of Europe; and the great-breasted rail or fresh-water marsh hen (*R. elegans*), about 20 inches long, which inhabits the marshes of the Southern States of the United States. The land rail, so named, is the CORN CRAKE (*q. v.*).

RAIL WAGON, a combination vehicle so constructed as to be readily convertible for use on any ordinary roadway or on a railroad track. It was invented by Joseph C. Brown, of Toledo, O., in 1898.

RAILWAY BROTHERHOODS, labor organizations of the employees of American railroads, chief of which are: Grand International Brotherhood of Locomotive Engineers, founded in 1863; Order of Railway Conductors of America, founded in 1868; Brotherhood of Locomotive Firemen, founded in 1873; Brotherhood of Railway Trainmen, founded in 1883; Brotherhood of Railway Telegraphers, founded in 1886. A number of others have been organized since, chief of which is the Brotherhood of Maintenance of Way Employees and Railroad Shop Laborers. This latter organization, of insignificant size before the war with Germany, being composed largely of unskilled laborers, acquired a membership of over 200,000 during the war and a large surplus in the treasury. Over a million dollars of this money was invested in two clothing and one glove factory, from which the organization now supplies its members with laborers' clothing and underwear and gloves at cost price. Before the war the railway brotherhood organizations were considered the most conservative of all American labor organizations. Through a system of adjustment boards, involving extended negotiations with employers in the settlement of complaints, strikes were rendered almost impossible. A strong legislative committee also made their influence strongly felt in the legislative bodies of the country. Powerful and influential, the members of the brotherhoods were the best paid element of the working classes of the country. Their organizations stood alone and independent from the rest of organized labor, not even being affiliated with the American Federation of Labor.

Since the war, however, and under the influence of Warren Stone, Chief of the Brotherhood of Locomotive Engineers, the brotherhoods have become the most radical of the regular labor bodies. In 1919 they united in presenting to the Federal Government a demand for the nationalization of the railroads of the country, the proposal becoming known as the Plumb Plan, being formulated by Glenn Plumb, attorney for the brotherhoods. Finding neither legislative nor popular support, the plan was abandoned early in 1920. In the latter part of 1919 and during 1920 several of the brotherhoods turned their attention toward Consumers' Co-operation as a means to bringing down the cost of living. "We realize," said Grand Chief Stone, "that by a continuous demand for higher wages, even though granted, we gain nothing if the cost of living continues to rise. What we want is, not a rise in wages, but a lowering of the cost of living." The principal brotherhoods had begun, in 1920, the establishment of a series of co-operative banks throughout the country, as a basis for further co-operative enterprises. In the spring of 1920 there occurred a revolt against the authorized heads of the brotherhoods from within the membership, known as the "outlaw strikes." All over the Eastern States, beginning in Chicago, railroad employees abandoned their work by the thousands, in spite of the appeals of the brotherhood leaders that they remain at their posts. The protest was considered to be against the delay in the fulfillment of promises made by government authorities that higher wages should be granted. Toward the summer of 1920 the outlaw strikes gradually dwindled without disrupting the brotherhood organizations.

RAILWAYS. No invention, aside from that of the steam engine itself, has had so revolutionary an influence on modern social and industrial conditions. Without railway transportation modern trade and commerce would be an impossibility.

Rails, as a means to facilitating the drawing of heavy loads, preceded the invention of the locomotive by more than a century. In 1649 wooden rails were laid by the collieries in the north of England for cars drawn by horses, for the transportation of coal from the pits to the near-by towns, and even to the waterfronts, where it could be loaded on barges and vessels. Along these flanged beams cars were drawn by horses with such comparative ease that instead of a load of 1,700 lbs. by a common road, a load of two tons could now be drawn by a single horse.

In about 1740 cast iron rails, fastened on wooden sleepers, were instituted. Ten years later iron rails were in gen-

eral use among the coal mines in the north of England and Scotland, and then it became a practice to link the cars together into trains. The next improvement was putting the flanges on the wheels instead of on the rails.

The invention of the steam engine drew the attention of inventors to the possibility of devising an engine which should serve as a motive power for the cars instead of the horses. The first man to complete a practicable locomotive was Richard Trevethick. In 1802 he took out a patent for a wheeled engine which should run on rails by its own power, and exhibited a model of it in London. Two years later, in 1804, he produced a steam carriage which hauled ten tons of coal along the rails at a speed of five miles an hour. It was the first locomotive, and although a success as far as it went, a considerable period passed before further experiments were made. This was due to the fixed belief among engineers that a smooth wheel could not draw a heavy load along a smooth track up an incline. It was not till 1812 that a small locomotive was put to practical use in drawing carloads of coal from the neighboring collieries to the city of Leeds, in the north of England. Trevethick, meanwhile, had lost interest in his invention.

In 1814 George Stephenson, an engineer, built a locomotive and put it in operation near Killingsworth, and demonstrated that it could draw heavy loads up an incline; his engine pulled 35 tons up an incline at a speed of four miles an hour. Yet it was not till 1825 that the first demonstration of a railway train in motion was given, on the Stockton-Darlington railway. On this occasion the locomotive, the product of Stephenson's genius, drew 22 cars filled with passengers, and 12 cars filled with coal, altogether 90 tons, at a speed of from five to twelve miles an hour.

In the following year a railway was begun between Manchester and Liverpool, a distance of thirty miles, and Oct. 1, 1829, was fixed as the day on which a grand competition was to be held between inventors of locomotives. Four engines appeared, two of which had been built by Stephenson and John Ericsson, the later subsequently becoming famous in this country as the inventor of the "Monitor." For fourteen days the trials continued, Stephenson's engine being finally accepted as the superior one.

The Manchester-Liverpool railway was opened for passenger and freight traffic in 1830, and immediately proved a big success. The great railway system was thereby inaugurated.

Railway promotion now assumed the proportions of a boom and spread to other countries, in spite of the opposition of the sceptical and the owners of canals. It is said that the King of France at this time sent one of his most capable ministers to investigate the new institution. On his return this functionary reported:

"Sire," he said, "railways may prove beneficial in England, but they are not adapted to conditions in France." Thus have many beneficial inventions been handicapped by the bigoted.

In the United States horse tramways, the predecessors of railways, were in use as early as 1807, when one was put in operation along Beacon Street, in Boston, for passenger service. The first railway on which a steam locomotive was utilized was laid in Pennsylvania, from Carbondale to Honesdale, a distance of sixteen miles, built by the Delaware and Hudson Canal Co., in 1829, when a locomotive for use on the road was imported from England. The first railway built in the United States especially for the purpose of steam traffic was the one begun in South Carolina, in 1830. Another road was built by the Baltimore and Ohio Railway Co., from Baltimore to Ellicott's Mills, Md., a distance of fifteen miles, being finished in 1830.

As in England, so in the United States there now began an era of railway construction which spread all over the country, with even more revolutionary effects in this country than in England. Lines were pushed out into howling wildernesses, not to accommodate an existing population and industry, as was the case in England, but for the definite purpose of developing population and industry in the future. Isolated settlements of pioneers suddenly found themselves facing the possibility of marketing their farm produce in the big communities near the seacoast and along the waterways, and extended their agricultural enterprises accordingly. Land hitherto valueless on account of its distance from civilization suddenly acquired a growing potential value, for railway transportation would bring its products within easy reach of the centers of population. The imagination of the more ambitious elements of the people were inflamed with these prospects, and a general migratory movement of the people began westward, followed by the railroads, sometimes actually preceded by them. The coal mines, too, suddenly found the whole populated part of the country thrown open to them as a market, and the coal industry began to experience a tremendous stimulus. With the possibility of receiving coal, small manufactories began springing up all over the Eastern States, along the

lines of the newly built railways. It was the beginning of the period of big and intensive enterprise.

Ever farther and farther westward pushed the railways. In 1852 Chicago was reached, and two years later the Mississippi river was in railway communication with the East. The produce of the big Mississippi Valley, which hitherto must be shipped down the river to New Orleans, now found a quicker channel to the markets of the world directly eastward. It was as though river steamboats, hitherto the only means of freight transportation on a large scale, had suddenly found it possible to sail over land as well as water, regardless of the devious paths of the waterways.

During the ten years ending with 1840 nearly 3,000 miles of tracks were laid. During the ten years following, ending with 1850, over 6,000 miles were laid, and at the end of the ten years following there were over 30,000 miles of track laid in the country.

The Civil War, naturally, checked the further development of railway enterprise for five years, but with the close of hostilities it was continued more energetically than ever. Railway lines were now pushed out into the great broad, fertile prairies, and where only a few years before buffaloes and Indians had roamed undisturbed, vast grain fields began to appear. Man power being insufficient, machinery was invented to work these broad stretches of rich agricultural lands, and the reaper and harvester appeared.

On May 10, 1869, the last spike was driven which fastened down to the sleepers the last rail necessary to complete the railway connection between the Pacific Coast and the Atlantic Seaboard. Now the rich fruit country W. of the Rockies was thrown open to the East and to Europe. The political significance of this achievement was no less important than its economic aspect, for without railway connection and the tremendous commerce which was to develop between East and West, it is highly improbable that the United States would have remained united under one Federal Union. A broad wilderness would have separated the two coast regions and divided their political interests, and each would have naturally followed its own course. Without railway communication so broad an area under the jurisdiction of one government would be inconceivable on a democratic basis.

Until 1890 the building of railways in the United States developed at a rate much faster than the rate of increase of the population. The building was being done on the prospects for the future. Then, gradually, there came a slowing down. The following table shows the rate of railway construction in the United States by decades:

	Miles.
1830	23
1840	2,218
1850	9,021
1860	30,626
1870	52,922
1880	93,262
1890	166,654
1900	194,321
1910	240,439

In 1918 the total mileage of railways had reached the total of 253,529, but since then there has been a decrease, rather than an increase, construction having come practically to a standstill since the beginning of the war with Germany.

The importance of the railways as an industry employing labor is shown in the following table:

Year	Employees	Per Thousand of Population
1880	418,957	84
1890	749,301	119
1900	1,017,653	134
1910	1,699,420	184

The employees enumerated in the above table include only those directly employed in the operation of railways, and not the many thousands of additional men engaged in the building of railway cars and equipment.

The financial aspect of the railway industry is told in the following figures:

Year	Invested	Per Cent. of National Wealth
1890	$8,040,707,804	12
1900	9,035,732,000	10
1910	16,148,532,502	8½

During the past forty years the passenger traffic, or the use made of the railways by the people for purposes of travel has increased three times faster than the population. And while the population doubled, freight traffic increased twelvefold. During the past 18 years, while population has increased a little over a third, freight traffic has increased by 180 per cent.

In 1916 and 1917 there came a crisis in the railway industry which has usually been associated with the war as a cause, a fact which is only indirectly true.

Early in the seventies the constant friction between the farmers of the Middle West and the railways over freight rates has led, largely because of the agitation of the Patrons of Husbandry

and similar farmers' organizations, to the institution of Federal regulation of interstate commerce (see INTERSTATE COMMERCE COMMISSION). Thus the power of the Federal Government became the chief factor in the fixing of freight rates. Until several years ago this system worked with fair satisfaction to all parties concerned. But then came the gradual rise in the prices of all products of industry, and, so far as the railways were concerned, the prices of steel rails and other metals and those raw materials needed for the manufacture of railway equipment also rose. Finally the demands of the powerfully organized railway employees caused a rise in the cost of labor. Unable to meet these rising costs with a proportionate increase in rates, to which the regulating bodies would not consent for fear of popular disapproval, the railway managements gradually found themselves facing a deficit in the financial administration of their lines.

The crisis came in 1917, with the outbreak of the war with Germany, when many of the railways of the country were on the verge of bankruptcy. To avert the threatened financial crisis in the railway industry, President Wilson, on Dec. 26, 1917, issued a proclamation instituting government administration of the railways of the country and suspending private management. The administration of all railways was immediately placed under a Director-General of Railways, who had not only the power to control, but actually to manage them and to appoint or dismiss such heads as he might choose.

Other contributing reasons there were, too, for this act; the need of pooling all the transportation resources and equipment of the nation for war purposes, which were for the time being paramount.

By an Act of Congress, which became law on March 21, 1918, the proclamation of the President was approved and Federal administration of railways was fixed for the duration of the war and for twenty-one months after, though the President retained the power to return the roads to private management any time after the close of hostilities, should he see fit. By this Act the private owners were to be allowed remuneration equal to the average earnings of the different roads during the three years preceding the taking over of the administration by the Government. A special Court of Claims was granted jurisdiction over any claims that might be made by railway owners under this guarantee, but in most cases special contracts were made with the individual railway companies, whereby these claims were adjusted.

Under Government administration railway rates, both passenger and freight, were substantially increased, yet on Aug. 1, 1919, Director-General Hines reported a deficit in the revenues of the railways under his control amounting to $296,000,000 for the first six months of the year.

The war having come to an end, there immediately arose a strong agitation, emanating from the RAILWAY BROTHERHOODS (*q. v.*) against the return of the roads to their private ownership, the alternative offered being a proposal known as the Plumb Plan, whereby it was proposed that the administration of the railways should remain in the hands of a commission on which the Government and the employees should be equally represented. This proposal, however, found little support outside the ranks of the organized railway employees and radical circles, and on Dec. 24, 1919, President Wilson signed a decree returning the railways to private administration, to take effect on March 1, 1920. Since then numerous hearings have been held regarding the financial condition of the railways of the country, with the result that a demand has been formulated by the various owners for heavy financial aid to be granted by the Government for the purpose of restoring the roads and their equipment to their former degree of efficiency, much deteriorated since the early days of the war.

RAIMONDI, MARCANTONIO, an Italian engraver; born in Bologna, Italy, late in the 15th century. A goldsmith by trade, he early turned to engraving, and received his first great stimulus from woodcuts of Albrecht Dürer, which he saw at Venice about 1505. At Rome, where he worked from 1510, he was chiefly engaged in engraving Raphael's works, as "Lucretia," the "Massacre of the Innocents," the "Three Doctors of the Church," "Adam and Eve," "Dido," "Poetry," the "Judgment of Paris," etc., and subsequently those of Raphael's pupil, Giulio Romano. He is accounted the best among the engravers of the great painter. He died some time before 1534.

RAIN, in meteorology, the fall of water in drops from the clouds, or the drops which fall. A cloud consists of aqueous vapor, the individual vesicles of which are very small. When by the constant condensation of fresh aqueous vapor these vesicles become large and heavy, and several of them unite, they are unable to resist the action of gravity and fall as rain. In geology, the

direct action of rain, as distinguished from its indirect one in creating streams, rivers, etc., is a potent aqueous cause. In many places, however, its effect is much diminished by the protective influence over the soil exerted by the vegetation. Penetrating into crevices of rocks, it is frozen and splits them. Moreover, in passing through the atmosphere, it absorbs a considerable amount of carbon dioxide, which enables it to transform the carbonate of lime in limestone rocks into the soluble bicarbonate, and ultimately waste them away; it acts also on feldspar, etc.

RAINBIRD, a name given somewhat indiscriminately to two cuckoos in Jamaica: (1) *Saurothera* (*Cuculus*, Linn.) *vetula*, a large handsome bird, soft brown-gray on the back, dullish yellow on the under surface, and rusty-red on the wings, with the long tail showily barred with black and white. It feeds on bugs, spiders, etc. It is sometimes also called tom fool, from its silly habit of gratifying its curiosity instead of securing its safety. (2) *Cuculus pluvialis;* head dark gray, merging on the neck into dark grayish-green, the hue of the back, rump, and wings, with metallic gloss. Tail feathers black, barred with white; throat and breast white; remaining under parts deep red-brown.

RAINBOW. The rainbow is the best known of all optical meteorological phenomena, consisting of a colored arch formed opposite the sun on falling raindrops, and visible whenever the necessary conditions of a passing shower on one side and a clear and not too high sun on the other occur. Two bows are frequently seen, each exhibiting the full spectrum of colors from red to violet; but in the inner or primary bow the red is the outer edge and violet the inner, while in the outer or secondary bow the order is reversed; the red being inside and the violet on the exterior. The colors are always arranged in a definite order, that of the solar spectrum—viz., red, orange, yellow, green, blue, indigo, and violet, but shade imperceptibly into each other. The cause of this breaking up of the sunlight into its constituent colors is explained in most physical and meteorological text-books.

Intersecting rainbows have frequently been seen. When the sun is reflected from a surface of still water a bow is formed by the reflected image as well as by the sun itself. Lunar rainbows often occur, but the feebleness of the moon's light usually prevents any colors being observed. There are many popular weather prognostications connected with rainbows, all dependent on the fact that they imply local passing showers. "A rainbow in the morning is the shepherd's warning; a rainbow at night is the shepherd's delight," is easily understood when we remember that the rainbow is formed opposite the sun, and that weather-changes generally pass from W. to E.

RAINES LIQUOR LAW, an act passed in 1896 by the Legislature of New York. It abolished excise boards; license to anyone not a criminal; raised cost of license from $250 to $800 in New York City; divided license fees between State and county in ratio of 1 to 2; permitted local option in towns but not in cities; no renewal within 200 feet of school or church without consent of two-thirds of owners; revoked license on individual complaint; forfeited license not renewed within five years; interior of saloons exposed to view when closed on Sundays; no free lunches; restaurants not to serve drinks with meals on Sunday; imposed penalty of six months to one year and twice license fee for selling without a license.

RAIN GAUGE, an instrument or contrivance for measuring the amount of rain which falls on a given surface. They are made of various forms. One simple form consists of a copper funnel five to seven inches in diameter, inserted in the neck of a bottle placed on a stand and protected from the sun's rays, to prevent evaporation. The rain collected in the bottle is measured in a glass jar having one-tenth the area of the funnel, and graduated so that a rainfall of one-tenth of an inch collected by the funnel is measured by one inch on the side of the vessel. The stand should be placed at a sufficient distance from any buildings, etc., to prevent their affecting the amount falling into the funnel.

RAINIER, MOUNT, a mountain of volcanic origin, the highest in the State of Washington, 14,520 feet high. It is a part of the coast range near Puget Sound, E. of Tacoma, and is sometimes called by the name of the city. The first ascent was made in 1870. There are several glaciers on this mountain, and it has a well-defined crater, which induces the belief that it is an extinct volcano.

RAIN PRINTS, indentations produced in geological times by raindrops on sedimentary strata when the latter were soft.

RAINSFORD, WILLIAM STEPHEN, an American clergyman; born in Dublin, Ireland, Oct. 30, 1850; was graduated at St. John's College, Cambridge, England, in 1872; was curate of St. Giles' Church, Norwich, England, in 1873–

1876; made missionary tours in the United States and Canada; was assistant rector of St. James Cathedral, in Toronto, in 1878–1882; and became rector of St. George's Church, New York City, in 1883. His publications include "Sermons Preached in St. George's" and "The Church's Opportunity in the City of Today"; "Preacher's Story of his Work" (1901); "The Reasonableness of the Religion of Jesus" (1908). He did much to supply wholesome recreation for the young of both sexes in the vicinity of his church, who were without the means to secure it for themselves.

RAIN TREE (*Pithecolobium saman*), a leguminous tree of tropical America, now largely planted in India for the shade it furnishes, and because it flourishes in barren salt-impregnated soils, as well as for its sweet pulpy pods, which are greedily eaten by cattle. Another species, *P. dulce*, has also been introduced into India, its pods also being edible.

RAINY LAKE, a sheet of water forming a portion of the boundary line between Ontario and the United States, W., and 100 miles distant from the nearest point of Lake Superior, and about 50 miles long. It discharges by Rainy river into Lake of the Woods.

RAISIN RIVER, a stream rising in Hillsdale co., Mich., and falling into Lake Erie, 2½ miles below Monroe, after a circuitous course of about 130 miles.

RAISINS, grapes dried in the sun. In the case of the best grapes the process is effected by cutting half through the fruit stalk without detaching it from the tree, or by gathering the grapes when fully ripe and dipping them in a lye made of the ashes of the burned tendrils, after which they are exposed to the sun, or they may be simply laid out to be desiccated. Inferior qualities are dried in an oven. Raisins are extensively produced in California. They are slightly refrigerant. In Europe and the United States they are used solely to sweeten preparations, in India they are given as medicine. They are an ingredient of compound tincture of cardamoms and tincture of senna.

RAJAH, or more correctly RÁJÁ, originally, a title which belonged to princes of Hindu race who, either as independent sovereigns or as feudatories, governed a territory. Now, however, the title is used of independent sovereigns, of subject or "protected" princes, of petty chiefs, of great landowners, and of some persons of eminence who are neither rulers nor landowners.

RAJAMAHENDRI (formerly often spelt Rajahmundry), a town of India, in the presidency of Madras; on the left bank of the Godavari, 30 miles from its mouth. It has a museum, a provincial school, two jails, and some Christian churches. From 1753 to 1758 it was held by the French.

RAJMAHAL, a decayed town of India; on a steep eminence on the right bank of the Ganges; 170 miles N. N. W. of Calcutta. It was long the chief town of the Bengal and Bahar provinces, but is now deserted and ruinous, being only noteworthy for the remains of its palaces, formerly belonging to Shah Shuja and Kasim Ali, and as a station in an important transit trade. The population consists largely of hillmen or "Paharias." Pop. (1920) about 75,000.

RAJPUTANA, an administrative territory of India. It lies between Sind on the W., the Punjab on the N., the Northwestern provinces on the E., and several native states of central India on the S. Its total area is 132,461 square miles, and its total pop. about 11,000,000. The most important of the native states is Jaipur, pop. 137,000. It gets its name from the ruling race of predominant Aryan tribes, called Rajputs. They are a proud aristocracy, own the soil, and have furnished ruling dynasties to very many of the native states in India. At the time of the Mohammedan invasions in the 11th century the Rajputs ruled over half a dozen strong states—Kanauj, Ajmere, Anhilwara, Udaipur, and Jaipur. From the end of the 16th to the middle of the 18th century these states acknowledged the supremacy of the Mogul Emperor of Delhi. Then they were made to recognize the Mahrattas as their masters; since the Mahrattas were crushed by the British the Rajput states are independent allies.

RAKE, an implement having a head provided with teeth and a long handle projecting from the head in a direction transverse to that of the teeth and nearly perpendicular to the head. Specific names indicate purposes or construction, as hay, stubble, barley, manure, horse, tilting, drag, etc. Hand rakes are of wood for hay or grain, and of metal for garden use. Horse rakes are of several kinds, some with, others without, wheels. In some the teeth are independent, so as to yield to obstacles without affecting the operation of other teeth. Also a small instrument, somewhat resembling a hoe, having a turned-down blade set at right angles to the handle, used by the croupier to collect the stakes on a gambling table.

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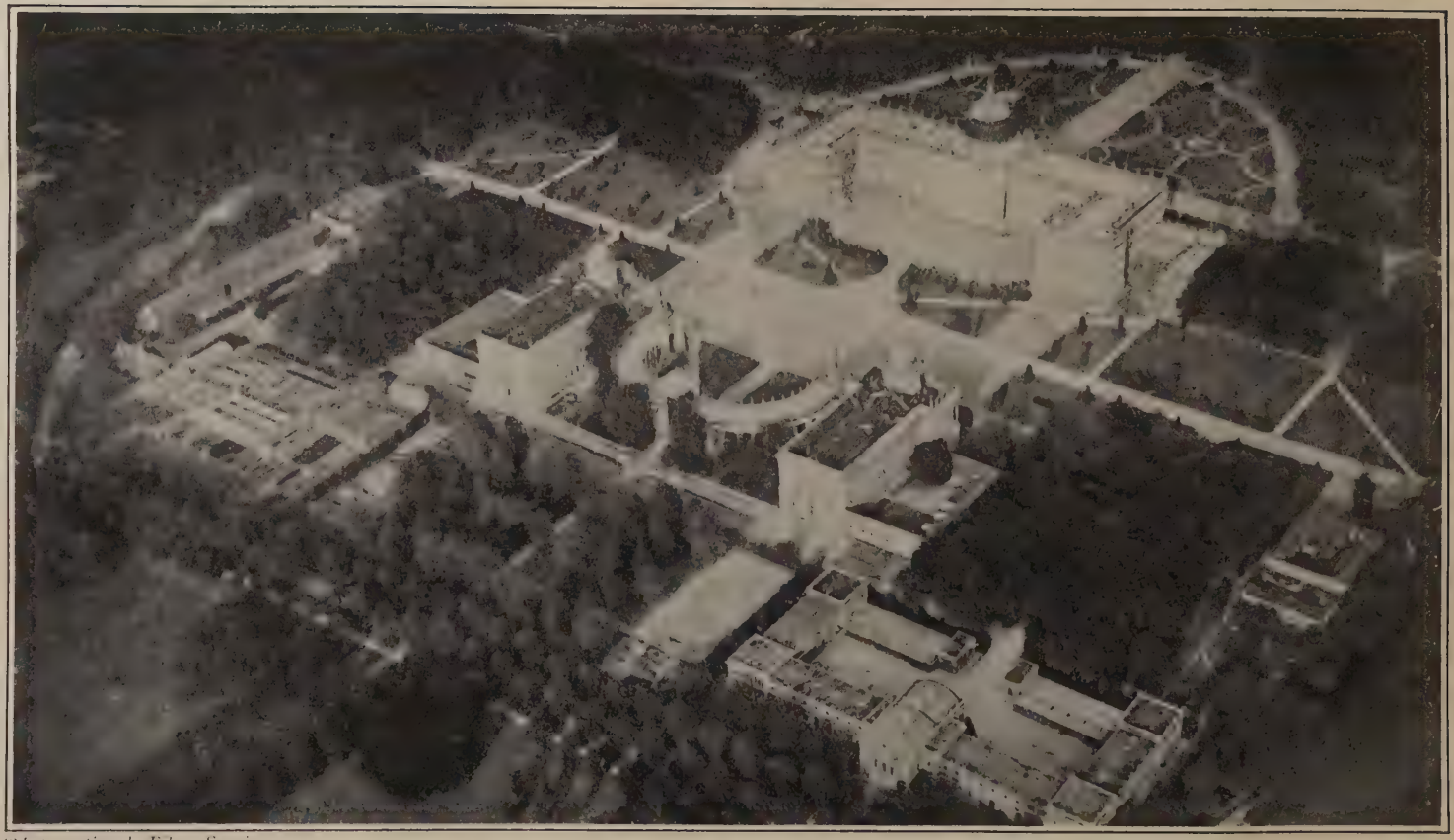
ETOILE CATHEDRAL AT LISBON, PORTUGAL



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THE PALACE OF THE FORMER GERMAN KAISER AT POTSDAM. A PHOTOGRAPH MADE FROM A GERMAN PASSENGER DIRIGIBLE

QUEBEC AND THE PLAINS OF ABRAHAM FROM THE ST. LAWRENCE

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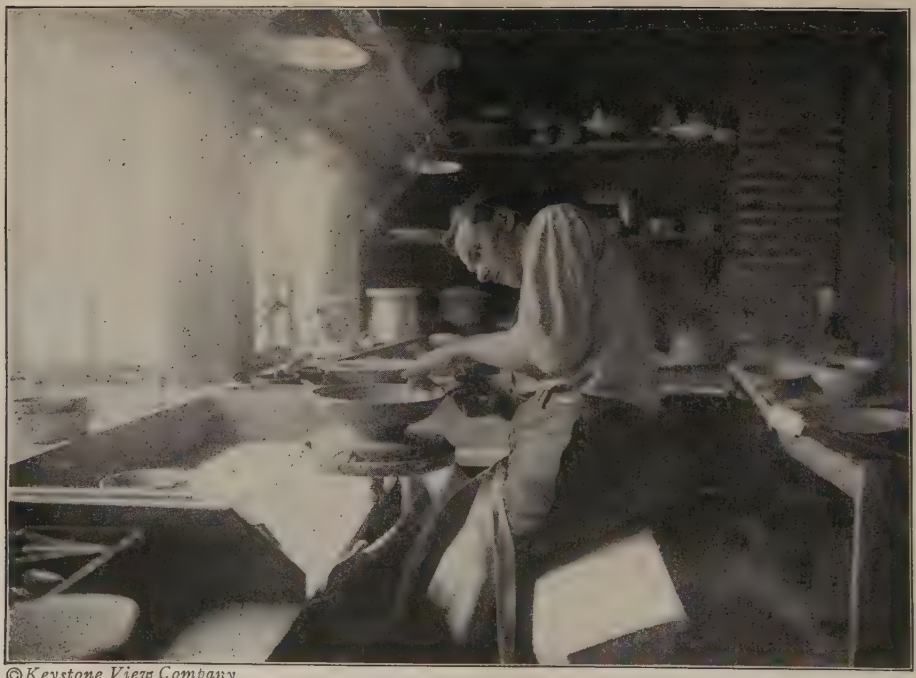
SPECIMENS OF AMERICAN POTTERY



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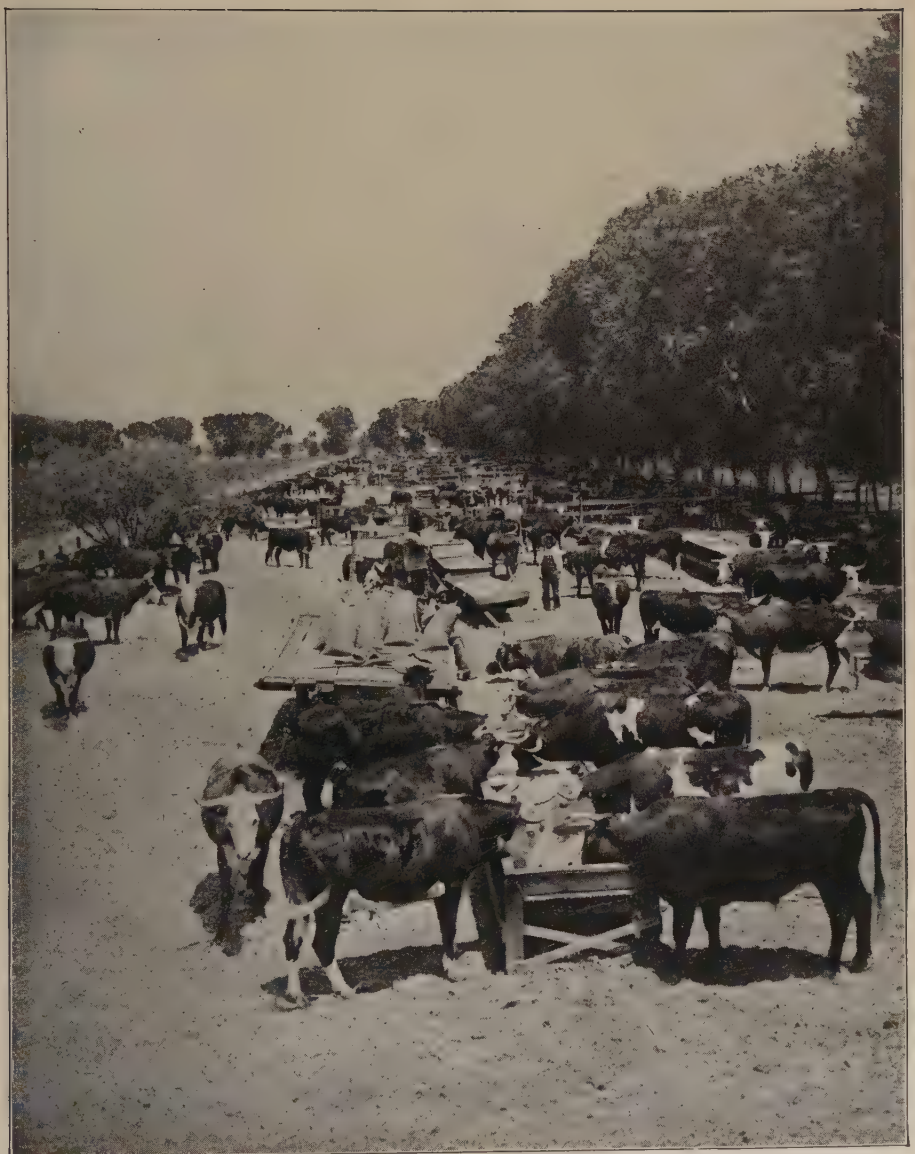
SHAPING CLAY ON THE POTTER'S WHEEL



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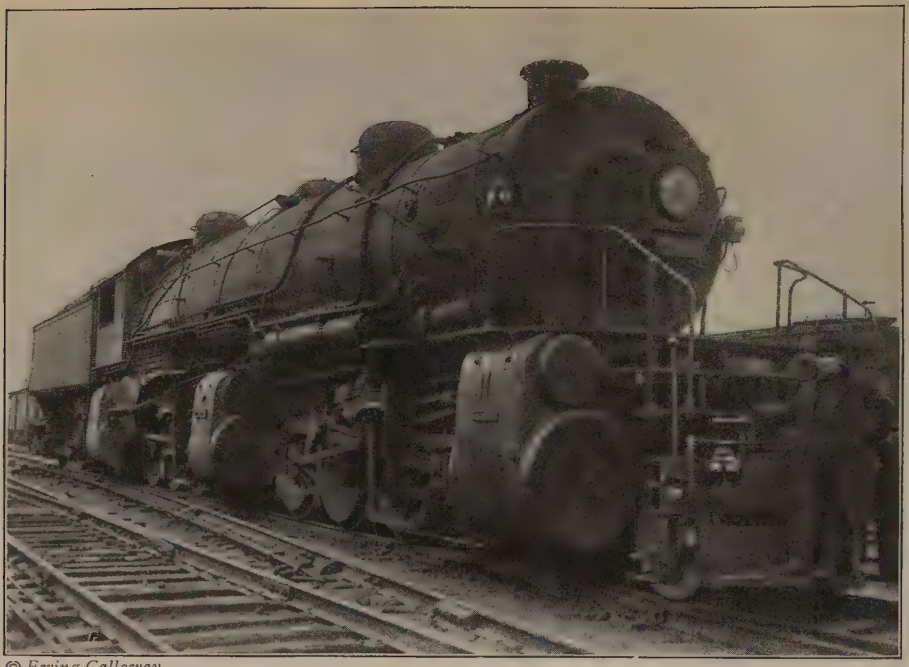
BEEF CATTLE FROM THE CATTLE RANGES IN THE SOUTHWESTERN UNITED STATES



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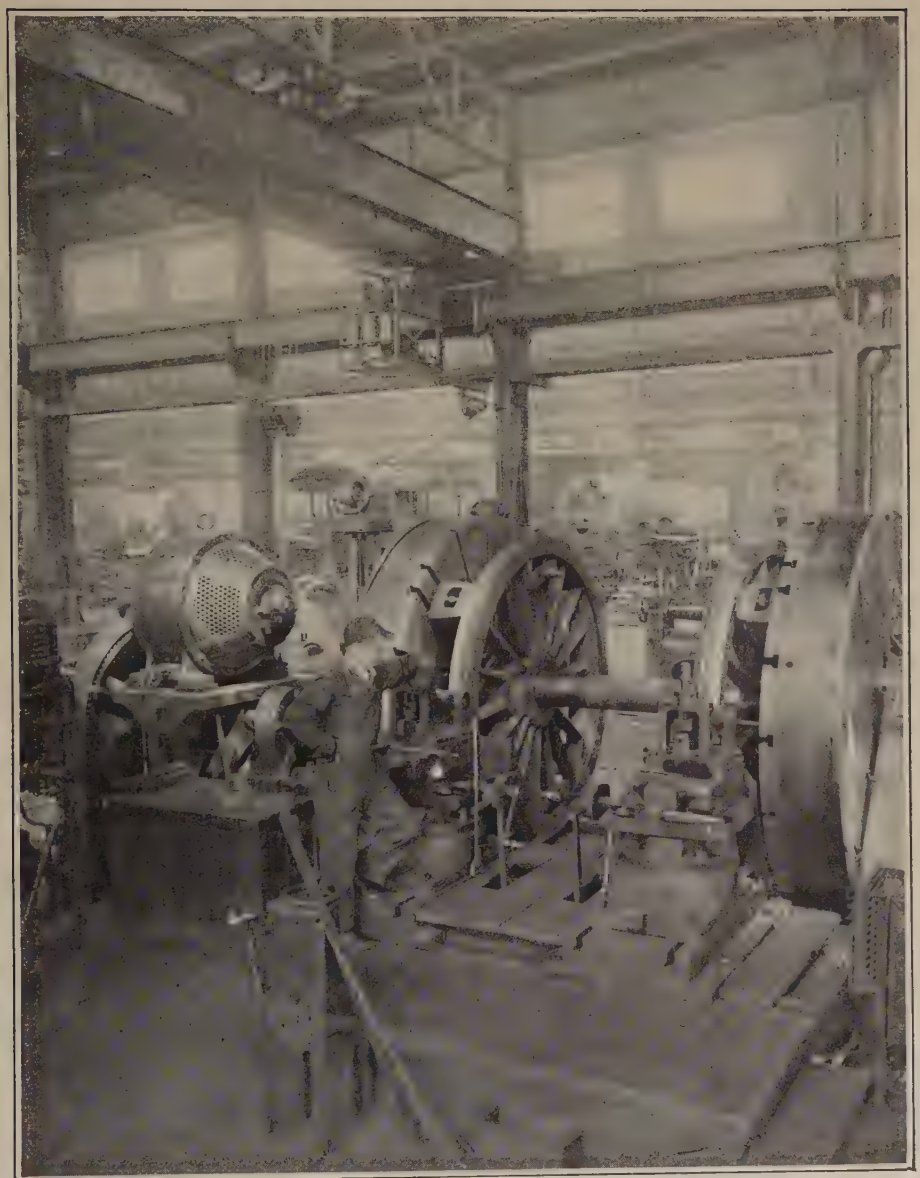
A HUGE PUSHER ENGINE FOR TAKING HEAVY TRAINS UP GRADES

© *Ewing Galloway*

A POWERFUL OIL-BURNING LOCOMOTIVE IN THE ROCKY MOUNTAINS



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TURNING TIRES FOR A LOCOMOTIVE DRIVE WHEEL IN THE WORKS AT BLOOMINGTON, ILLINOIS

© *Underwood & Underwood*

RAGUSA, ON THE COAST OF DALMATIA

RAKOCZY MARCH, a simple but grand military air by an unknown composer, dating from the end of the 17th century. The Hungarians adopted it as their national march. The air most generally known out of Hungary as the Rakoczy march is one by Berlioz in his "Damnation of Faust"; Liszt also wrote an orchestral version of the original.

RAKSHASAS, in Hindu mythology, a class of evil spirits or genii, cruel monsters, frequenting cemeteries, devouring human beings, and assuming any shape at pleasure. They are generally hideous, but some, especially the females, allure by their beauty.

RALE, in pathology, a noise or crepitation caused by the air passing through mucus in the bronchial tubes or lungs.

RALEIGH, a city, capital of the State of North Carolina, and county-seat of Wake co.; on the Southern, the Seaboard Air Line and the Norfolk Southern railroads, 28 miles S. E. of Durham. Here are the State Capitol, United States Government Building, State Penitentiary, State Institution for the Deaf and Dumb and the Blind, State Asylum for the Insane, Home for Incurables, Rex Hospital, State Agricultural and Mechanical College, Baptist Female College, Male Academy, Shaw University (Bapt.), Peace Institute (Pres.), St. Augustine's School (P. E.), St. Mary's School (P. E.), and, near the city, the University of North Carolina, and Wake Forest College (Bapt.). The city contains electric street railroads, gas and electric lights, waterworks, National and savings banks, and daily and weekly newspapers. It has a large trade in cotton and tobacco, and its industries include flour mills, phosphate works, foundries and machine shops, brick making plants, car and car wheel shops, ice factory, etc. Pop. (1910) 19,218; (1920) 24,418.

RALEIGH, SIR WALTER, an English explorer, historian, and essayist, born at Hayes, Devon, England, about 1554. He was a half-brother of two other famous Elizabethan "knights-errant of the seas," Humphrey and Adrian Gilbert. For a time he studied at Oriel College, Oxford, but in 1569 he was fighting in France. Tradition has it that he was with Sidney in Paris at the time of the Massacre of St. Bartholomew (1572). By 1577 he was back in England and a little later had his first over-seas experience under Sir Humphrey Gilbert. In 1580 he was in Ireland, with Lord Grey, returning the next year with despatches, when he attracted the attention of the Queen, according to tradition, by spreading his new cloak upon a muddy place in her pathway. He became one of the Queen's secretaries and held many important offices. He was interested in colonizing projects, and in 1584 secured a charter to lands in America. He immediately fitted out two ships for exploration along the coast of Virginia and the Carolinas, and a few months later sent his cousin, Sir Richard Grenville, to plant a colony on what is now the eastern coast of North Carolina. The increasing tension with Spain diverted him from these projects for a time. He played an important part in the defense against the threatened invasion by the great Armada (1588), and after the peril was over went to Ireland, where the Queen had given him a large estate. Here he met Spenser, whom he persuaded to return to England with the first part of the "Færie Queene." That the two men were on terms of intimacy is shown by the facts that Spenser dedicated his great poem to Raleigh, that Raleigh returned the compliment by writing a beautiful sonnet in praise of his friend's poem, and that Spenser tells, in "Colin Clout," of their talks together and gave him the happy title of "Shepherd of the Ocean."

SIR WALTER RALEIGH

In 1591-1592 Raleigh lost, temporarily, the Queen's favor through his marriage with Elizabeth Throgmorton. He wrote a spirited account of the last fight of the "Revenge," lost in an engagement with the Spanish fleet near the Azores, Raleigh's story being the basis for one

of the best of Tennyson's ballads. After he had regained the favor of the Queen, he turned once more to his colonizing schemes. In February, 1595, he began his voyage to Guiana, his object being to fight Spain by cutting off the source of Philip's supplies, the immense wealth of the South American provinces. His story of this expedition is one of the most brilliant stories of travel in our literature, important not only for historical reasons and for the charm of its style, but also because it showed the abiding passion of his life, to found an English nation in the new world. Immediately upon his return he was one of the commanders of an expedition against Cadiz, which resulted, largely through his efforts, in a great victory for England. Descriptions of the battle, and of the later engagements at Fayal, are to be found in his writings; he was both man of action and historian.

It is impossible within the limits of a brief sketch to set down the activities of Raleigh, now at the zenith of his power. He was in high favor with the Queen. He had charge of the entertainment of distinguished foreign visitors. He is said to have been the founder of the famous meetings of wits and men of letters at the Mermaid. He sat in Parliament, and played his part as zealously as though his one ambition were to handle parliamentary business. He was Governor of Jersey, and instituted many reforms. He never abandoned his idea of colonization, sending new expeditions to both Guiana and Virginia. He developed his private property as though his sole interest were to be a man of affairs. Yet he won no office at all commensurate with his great ability, and the chief impression we get of these busy years is that of resistless energy spent on a dozen fields, any one of which might have contented a man of ordinary ambition.

With the accession of James (1603) his fortune failed. Accused from the first of hostility to the claims of the new Stuart King, he became the victim of the ambition and jealousy of men who were desperately striving to secure favor for themselves. He was accused of treason, was convicted, and in November, 1603, was sentenced to death. In a short time, so great was the storm of indignation aroused by this treatment, he was reprieved, and began his long imprisonment in the Tower. For 12 years he was a captive, but he made these years glorious by the triumphs of his mind. He turned his cell into a research laboratory, scientific, historical, and on matters of state. He wrote a "History of the World," distinguished for its learning, its philosophy, and the quality of its style. He wrote many tracts on government and on England's destiny. He urged the building of a merchant marine, the building of a fleet able to command the seas, and the establishment of an imperial domain in America. Only in this way could England curb the power of Spain. "The matter," he said, "is nothing less than the sovereignty of the whole world." His writings had the power of his personality; they stimulated the imaginations of all Englishmen. He founded no colony, no navy, no merchant marine, yet it was his vision that later became the reality on which so much of England's greatness was to rest. Finally, in 1617, he was released for the purpose of making one more attempt to found a colony in Guiana. The expedition failed, and he returned, a broken old man, to the Tower. He was put through the formality of a second trial for treason; his enemies triumphed, and he was executed, Oct. 29, 1618.

RALLENTANDO, in music, a direction that the time of the passage over which it is written is to be gradually decreased.

RALPH, JAMES, an English poet; born in Philadelphia, Pa., about 1695. He went to England in 1725 with Benjamin Franklin, and was unsuccessful in his first efforts to win public favor. His poem on "Night" (1728) was ridiculed by Pope in his "Dunciad"; but his continuation of Guthrie's "History of England" (1744–1746) won public praise. He died in Chiswick, England, Jan. 25, 1762.

RALPH, JULIAN, an American journalist; born in New York, May 27, 1853. He was connected with the New York "Sun" (1875–1895); the New York "Journal" (1896); the London "Daily Mail" (1899). His publications include: "On Canada's Frontier"; "Our Great West"; "People We Pass"; "Alone in China, and Other Stories"; "An Angel in a Web"; "War's Brighter Side"; etc. He died Jan. 20, 1903.

RAM, in machinery, the weight of a pile or post driver (see MONKEY). In nautical language: (1) A beak of iron or steel at the bow of a war-vessel, designed to crush in the sides of an adversary by running against her "end on"; the ram can be detached from the vessel. (2) A steam iron-clad, armed at the bow below the water-line with such a beak. In old warfare, same as BATTERING RAM (*q. v.*). In shipbuilding, a spar, hooped at the end, and used for moving timbers on end by a jolting blow.

RAMADAN, the ninth month in the Mohammedan year. In it Mohammed received his first revelation, and every believer is therefore enjoined to keep a strict fast throughout its entire course, from the dawn—when a white thread can be distinguished from a black thread—to sunset. During the night, however, the most necessary wants may be satisfied—a permission which, practically, is interpreted by a profuse indulgence in all sorts of enjoyments. The sick, travelers, and soldiers in time of war are temporarily released from this duty, but they have to fast an equal number of days at a subsequent period when this impediment is removed. Nurses, pregnant women, and those to whom it might prove really injurious are expressly exempt from fasting.

RÁMÁYANA, the name of one of the two great epic poems of ancient India (the other, see MAHABHARATA). Its subject matter is the history of Ráma, and its reputed author is Valmiki, who is said to have taught his poem to the two sons of Ráma. But though this latter account is open to doubt, it seems certain that Valmiki was a real personage, and, moreover, that the Rámáyana was the work of one single poet—not, like the Mahábhárata, the creation of various epochs and different minds. As a poetical composition the Rámáyana is therefore far superior to the Mahábhárata; and it may be called the best great poem of ancient India. Whereas the character of the Mahábhárata is cyclopædic, its main subject matter overgrown by episodes of the most diversified nature, the Rámáyana has but one object in view, the history of Ráma. Its episodes are rare, and restricted to the early portion of the work, and its poetical diction betrays throughout the same finish and the same poetical genius. Whether we apply as the test the aspect of the religious life, or the geographical and other knowledge displayed in the two works, the Rámáyana appears the older. It is the chief source whence our information of the Ráma incarnation of Vishnu is derived. The Rámáyana contains professedly 24,000 epic verses, or "Slokas," in seven books—some 48,000 lines of 16 syllables. The text which has come down to us exhibits, in different sets of manuscripts, such considerable discrepancies that there are practically two recensions. The one is more concise in its diction, and has less tendency than the other to that kind of descriptive enlargement of facts and sentiments which characterizes the later poetry of India; it often also exhibits grammatical forms and peculiarities of an archaic stamp, where the other studiously avoids that which must have appeared to its editors in the light of grammatical difficulty. There can be little doubt that the former is the older and more genuine text.

RAMBAUD, ALFRED NICOLAS, a French historian; born in Besançon, Doubs, France, July 2, 1842. Of his works the most important is the "History of French Civilization" (3 vols. 1885), which is used as a text-book in nearly all universities. His other publications include: "French Domination in Germany, 1792–1804" (1874); "Germany Under Napoleon I." (1874); "The French and the Russians," etc., (1877); "History of Russia" (1878); "History of Civilization in France" (1887). He died Nov. 10, 1905.

RAMBOUILLET, CATHERINE DE VIVONNE, MARQUISE DE, a French social leader; born in Rome, Italy, in 1588. In 1600, when only 12 years old, she married Charles d'Angennes, son of the Marquis de Rambouillet, to whose title and estates he succeeded on the death of the latter in 1611. Her residence at Paris, the Hôtel Rambouillet, for more than 50 years formed the center of a circle which exercised great influence on French language, literature, and civilization. She died in Paris in 1665.

RAMEAU, JEAN PHILIPPE, a French musician; born in Dijon, Sept. 25, 1683. At 18 he went to Milan, but soon returned to France, to Paris, Lille, and Clermont in Auvergne. Here he acted as organist to the cathedral, and wrote his "Treatise on Harmony" (1722). Removing to Paris, he published "Modern System" (1726); "Harmonic Generation" (1737), and "Modern Reflections" (1752). In 1733, at the mature age of 50, he produced his first opera, "Hippolyte and Aricie," the libretto of which was written by the Abbé Pellegrin. It created a great sensation. Rameau's best opera was "Castor and Pollux," produced at the Académie Royale de Musique in 1737. Between 1733 and 1760 he composed 21 operas and ballets, as well as numerous harpsichord pieces. Louis XV. created for him the office of composer of chamber music, granted him letters of nobility, and named him a Chevalier de St. Michel. Rameau died Sept. 12, 1764.

RAMÉE, LOUISE DE LA. See OUIDA.

RAMESES, or **RAMSES**, the name of several Egyptian monarchs; the name signifies "born of the sun," or the "nascent sun." The family is supposed to have been of Theban origin, and to have been descended from one of the later

queens of the 18th dynasty. According to the Roman authors Troy was taken in the reign of Rameses II. He is the supposed Sesostris of most authors, and his sarcophagus and mummy were found in Egypt in 1890. Rameses III. was the chief of the 20th dynasty, the Rhampsinitus of Herodotus, called Meriamoun, or beloved of Ammon, who defeated the Philistines, the Mashuash, and the Libyans, carrying on important wars from the 5th to the 12th year of his reign; he also made conquests in the 16th, and seems to have reigned 55 more years. He founded the magnificent pile of edi-

RAMESES II.

fices of Medinat Habu, embellished Luxor, Gurnah, and other parts of Egypt. In 1889 the sarcophagus and mummies of himself and his queen were discovered in Egypt in a marvelous state of preservation. Rameses IV. reigned a short time and performed no distinguished actions. Rameses V., of whom inscriptions are found in Silsilis. Rameses VI., whose tomb at the Biban-El-Meluk contains some astronomical records, from which the date of his reign has been calculated at 1240 B. C. Rameses VII. VIII., IX., X., and XI., undistinguished monarchs. Rameses XII., who reigned above 33 years, in whose reign the statue of the god Chons was sent from Egypt to the land of the Bakhten to cure a princess of the royal family of that court with which Rameses had contracted an alliance. Rameses XIII. was an important monarch. Rameses is also the name of one of the fortresses or treasure cities built by the Hebrews during their residence in Egypt.

RAMESWARAM, a low sandy island in the Gulf of Manaar, between the mainland of India and Ceylon. It is about 11 miles long and 6 broad, and contains one of the most venerated Hindu temples in India, the resort of thousands of pilgrims. Pop. about 18,000.

RAMIL, a plant producing what is popularly known as China grass. The value of ramil as a textile fiber has long been known. China has been making ramil fabrics since the time of Confucius, and the ancient Romans wore robes woven of its silky floss. China not only supplies an enormous home demand, but also exports annually hundreds of millions of pounds to foreign lands. The plants, which are indigenous to Asia, are now grown quite extensively in South America and other warm countries. The plant does well in the S. part of the United States and a finer fiber can be grown there than in the tropics. In such a climate the fiber is long, silky and brilliant, and textiles made from it are stronger than linen and have the luster of silk. One obstacle to the general use of this fiber has been the difficulty of extracting the filaments from the rest of the stalk, but a machine has been invented by an American which removes this.

RAMILLIES, a village of Brabant, Belgium; 14 miles N. of Namur; memorable as the place near which, May 23, 1706, the French forces under Marshal Villeroy and the Elector of Bavaria were defeated by Marlborough, with the loss of almost all their cannon and baggage, and 13,000 killed and wounded. This victory compelled the French to give up the whole of the Spanish Netherlands. It was the scene of hard fighting in 1914 when the German armies overran Belgium. It was held by them until the closing months of the war, in 1918.

RAMNAGAR, two towns of India: (1) a town of the Northwestern Provinces; on the right bank of the Ganges, 2 miles above Benares. It contains a palace, the residence of the rajah of Benares, which rises from the banks of the sacred stream by a number of fine ghâts or flights of stairs. There is a fort, and whips and wicker-work chairs are manufactured. (2) A town of the

Punjab, on the Chenab river, 28 miles N. W. of Gujranwala. It was a place of great importance in the 18th century, being then known as Rasulnagar, but was stormed by the Sikhs under Ranjit Singh in 1795, and its name changed to Ramnagar. The inhabitants make leathern vessels. A large fair is held here every April.

RAMPANT, in heraldry, standing upright on the hind legs (properly on one foot only), as if attacking (said of a beast of prey, as the lion). Counter-rampant, said of an animal rampant toward the sinister. When applied to two animals the term denotes that they are rampant contrariwise in saltire, or that they are rampant face to face.

RAMPART, in fortification, an elevation or mound of earth round a place, capable of resisting cannon shot, and on which the parapet is raised. The term in general usage includes the parapet itself.

RAMPHASTOS, the generic name of the toucans.

RAMPION, *Campanula Rapunculus*, a plant of the natural order *Campanulaceæ*, or bellworts, indigenous to Great Britain, as well as to various parts of the continent of Europe. Its root may be eaten in a raw state like radish. Both leaves and root may also be cut into winter salads.

RAMPOLLA, MARIANO DEL TINDARO, an Italian clergyman; born in Polizzi, Sicily, Aug. 17, 1843; was a member of the Sicilian aristocracy, which enabled him to reach a very exalted position in the Catholic hierarchy. On the decease of Cardinal Jacobini, the Papal Secretary of State, in 1887, Pope Leo XIII. created Rampolla a cardinal and also appointed him Papal Secretary of State. He at once began to make his influence felt in foreign affairs. His principal object was a political alliance with France, in order to insure the support of that country in the restoration of the temporal power of the Pope. To this end he was the first to discard the French Royalist party. The French Republic was solemnly recognized by him, and the French clerical electorate encouraged to vote for the Republican candidates. The Dreyfus affair, however, having given to the French policy a different turn, destroyed entirely the plan. Rampolla was also the prefect of several congregations, and Grand Prior of the Military Order of Malta. It was believed that he would be elected Pope in 1903, but Austrian interests were opposed to him, and Pius X. was raised to the Papal throne. Rampolla resigned office. He died in 1913.

RAMPUR, the capital of a native State of India; in the Northwestern Provinces; on the Kosila river, 110 miles E. by N. of Delhi. It manufactures damask, pottery, sword-blades, and jewelry. Pop., city about 80,000; state about 550,000.

RAMPUR BAULEAH, chief town of the Rajshahi district of Bengal, India, on the N. bank of the Ganges; is a center of silk and indigo trade, and has an English Presbyterian mission.

RAMSAY, ALLAN, a Scotch poet; born in Leadhills, Lanarkshire, Scotland, Oct. 15, 1685. In early youth, he was sent to Edinburgh, and there bound apprentice to a wig-maker. In 1712, he produced his first poetic effusion, and in 1716, commenced business as a bookseller in Edinburgh. In 1720, he published a collection of his fugitive poems, which realized a considerable sum; and in 1724 he issued the first volume of his well-known "Tea-Table Miscellany." His fame, however, reached its acme on the production of "The Gentle Shepherd," one of the finest dramatic pastorals ever penned. Some of the higher class poems of Burns alone can compete with it in this respect. Ramsay died in Edinburgh, Jan. 7, 1758.

RAMSAY, ANDREW MICHAEL, known as the CHEVALIER RAMSAY, a Scotch-French writer; born in Ayr, Scotland, Jan. 9, 1686. After spending some time at the Universities of Edinburgh and St. Andrews, he went to Leyden. In 1710 he repaired to Cambray, where he was converted to the Roman Catholic faith by Fénelon. He procured the preceptorship to the Duke of Château-Thierry and the Prince of Turenne, and was afterward engaged to superintend the education of Prince Charles Edward Stuart and his brother Henry, afterward Cardinal York. He acquired distinction by his writings. The chief of these are a "Life of Viscount Turenne," a "Life of Fénelon," the "Travels of Cyrus," a romance, and a large work on the "Principles of Natural and Revealed Religion." He died in St. Germain-en-Laye, France, May 6, 1743.

RAMSAY, SIR WILLIAM, a British scientist; born in Glasgow in 1852. He received his doctor's degree at Tübingen when he was but 20 years of age, and a few years later became Professor of Chemistry at the University College, Bristol. In 1887 he was appointed to the chair of chemistry in the University College, London, a position he held until he retired in 1913. He made several important discoveries in chemistry, mostly in connection with air, discovering argon,

neon, xenon, and krypton, all constituents of the atmosphere. He has written several important works, among them "The Gases of the Atmosphere: the History of Their Discovery" (1905); "Introduction to the Study of Physical Chemistry"; "Elements of Electrons." He died in 1916.

RAMSBOTTOM, a town in Lancashire, England, on the river Irwell, near Bury. It is a modern factory town, an outgrowth of the Lancashire cotton industry. Its industries include cotton mills, calico-printing works, bleaching grounds, coal mining, steel foundries, and granite quarries. Pop. about 16,000.

RAMSDEN, JESSE, an English mathematical instrument-maker; born in Salterhebble, near Halifax, Yorkshire, England, in 1735. He began life as a cloth worker. About 1755 he moved to London, and shortly afterward began to work as an engraver. He spent his best efforts in effecting improvements in the sextant, theodolite, equatorial, barometer, micrometer, mural quadrant, etc. He so improved the sextant that its range of error was diminished from 5 minutes to 30 seconds. He made the theodolite for the ordnance survey of England. He devised the mural circle, and made the first for Palermo and Dublin. He spent several years over an instrument for graduating mathematical instruments and published an account of it as "Description of an Engine for Dividing Mathematical Instruments" (1777). He was elected a Fellow of the Royal Society in 1786, and was voted the Copley medal in 1795. He died in Brighton, England, Nov. 5, 1800.

RAMSGATE, a watering place and seaport of Kent, England, on the Isle of Thanet; 72 miles E. by S. of London. From a small fishing village it began to increase in importance during the 18th century through successful trade with Russia and the East country, and through the formation here (1750–1795) of a harbor of refuge for the Downs. That harbor, 51 acres in extent, has a sea entrance 250 feet wide, is inclosed on the E. and W. by two piers 670 and 520 yards long. Among its special features are an obelisk marking the spot where George IV. in 1821 embarked for Hanover, a beautiful Roman Catholic church by the Pugins, a Benedictine monastery, college, and convent, and a Jewish synagogue and college erected by Sir Moses Montefiore, who, like the elder Pugin, was a resident. To the N. is Broadstairs, and to the W. Pegwell Bay, with Ebbsfleet, the landing place of St. Augustine, and also, traditionally, of Hengist and Horsa. Here, too, is Osengall Hill, with an early Saxon cemetery. It was bombarded several times during the World War by German naval vessels. Pop. about 30,000.

RANCÉ, ARMAND JEAN LE BOUTHILLIER DE, the founder of the reformed order of La Trappe; born in Paris, France, Jan. 9, 1626. He embraced the ecclesiastical profession, and held no fewer than six benefices. Residing at Paris, he gave himself up to a life of dissipation. In 1657, however, a marked change took place in his character. He demitted all his benefices except the priory of Boulogne and the abbey of La Trappe. Retiring to the latter place in 1664, he began those reforms which have rendered his name famous (see LA TRAPPE). He died in Soligny-la-Trappe, Orne, France, Oct. 12, 1700.

RANCHING, the business of cattle-breeding as pursued on a large scale in the unsettled districts of the United States from the Mississippi to the Pacific coasts, and from the Bad Lands of the Upper Missouri to the Gulf of Mexico. The name is derived from the Spanish rancho, properly "mess" or "mess room," but used in Mexico also for a herdsman's hut, and finally for a grazing farm, as distinguished from a hacienda, a plantation or cultivated farm. The specialty of ranching is that the cattle are raised and kept in a half-wild condition, with little or no house shelter provided and no artificial feeding.

Large fortunes were made in the wild old days, but the gradual settlement of the ranching country has seriously embarrassed the business of the ranchman.

The great events of the ranchman's year are the "round-up," when stock is taken, the cattle are branded, and such full grown cattle gathered into a herd as are suitable for market; and the departure of the herds for market or port—times of hard work and severe strain for all concerned.

RANCHO, a rude hut where herdsmen and farm-laborers live or only lodge; a farming establishment for rearing cattle and horses. It is thus distinguished from a hacienda, which is a cultivated farm or plantation.

RAND, THE, or WHITE WATERS RANGE, a small tract of land, extending 25 miles either side of Johannesburg, South Africa, and famous for its mineral wealth. Discovered in 1885. The reefs are accessible and rather easily worked. The deposits are unique in their unparalleled persistence of ore, which is interspersed in the quartz and sandstone. It

is not of very high quality, yielding about $10 per ton. There are about 10,000 stamps in the district, which can crush 7,000,000 tons a year. The Boer War passed over Johannesburg without doing any vital damage to the plants. Just before the war it was yielding at the rate of $100,000,000 a year, or one-third of the world's production. The reefs are over a mile deep, and conditions favor deep mining. The deposits are not, as asserted, practically unlimited.

South Africa rivals the United States in disrespect for tradition. In fact, its brightest pioneers are Americans, and the leading figure among Johannesburg engineers is Hennan Jennings, a Harvard graduate. There are many problems ahead of the Rand, the chief being that of power. There are no navigable rivers, and practically no waterfalls. The Kaffir, of whom there are 100,000 in the Rand, is lazy and dissolute, and the Boer War made him worse and scarcer; while the climate makes white menial labor impossible.

RANDALL, JAMES RYDER, an American journalist and composer; born in Baltimore, Md., Jan. 1, 1839; was educated at Georgetown College, D. C. He taught for a while in a Louisiana college, and then turned to journalism. Shut out from the army by a delicate constitution, he still gave powerful aid to the Southern cause by his lyrics. These include, besides "Maryland, My Maryland" (1861; called forth by news of the passage of the first Massachusetts troops through the streets of Baltimore); "Stonewall Jackson"; "There's Life in the Old Land Yet"; etc. After 1866 he edited a paper in Augusta, Ga. He died Jan. 14, 1908.

RANDALL, SAMUEL JACKSON, an American statesman; born in Philadelphia, Pa., Oct. 10, 1828. In 1862 he was elected to Congress, serving continuously till his death. He was Speaker of the House, 1876–1881. As such he used his influence in guiding the House through the dangerous crisis produced by the uncertainty of the presidential election of 1876. He died in Washington, D. C., April 12, 1890.

RANDOLPH, ALFRED MAGILL, an American clergyman; born in Winchester, Va., Aug. 31, 1836; was graduated at William and Mary College in 1855 and at the Virginia Theological Seminary in 1858; was ordained in the Protestant Episcopal Church; became rector of St. George's Church, Fredericksburg, Va., in 1860, and remained there till the assault on the town by the Union troops in 1862. He was a chaplain in the Confederate army in 1863–1865, and was rector of Emmanuel Church, Baltimore, Md., in 1867–1883. In 1892 he was elected bishop of the Southern Virginia diocese. Published "Reason, Faith, and Authority in Christianity" (1902). He died in 1918.

RANDOLPH, EDMUND JENNINGS, an American statesman; born in Williamsburg, Va., Aug. 10, 1753; studied at William and Mary College, and was admitted to the bar. In 1776 he helped to frame the constitution of Virginia, and became the State's first attorney-general. In 1786–1788 he was governor of Virginia, and in 1787 a member of the convention which framed the Constitution of the United States. In 1789, he was appointed by Washington Attorney-General of the United States. In 1794 he was made Secretary of State, but after the President's signing of the Jay Treaty (1795) with England he resigned in order to be free to vindicate his own conduct. Meanwhile he was practically ruined by the responsibility which he had incurred, as part of the duties of his office, for certain funds provided for foreign service; and had to assign his lands and slaves. He died in Clarke co., Va., Sept. 13, 1813.

RANDOLPH, JOHN, "of Roanoke," an American statesman; born in Cawsons, Chesterfield co., Va., June 2, 1773. He claimed descent from Pocahontas, the Indian princess. He was educated for the law, but turned to politics. In 1799 he was elected to Congress, where he became the acknowledged leader of the administration party. His opposition to the War of 1812 caused his defeat in the following election; but he was re-elected to Congress in 1814. From 1825 to 1827 he was a United States Senator. In 1829 he was a member of the convention for revising the constitution of Virginia, and the year following was appointed United States minister to Russia. On his return he was again elected to Congress, but was unable to occupy his seat. He died in Philadelphia, Pa., June 24, 1833.

RANDOLPH, THOMAS, an English poet and dramatist; born in Houghton, Northamptonshire, England, in 1605. He was educated at Westminster and Cambridge, and was admitted to a fellowship. He early began to write, and gained the friendship of Shirley, and Ben Jonson. He left a number of bright, fanciful, and occasionally too glowing poems, and six plays: "Aristippus, or the Jovial Philosopher"; "The Conceited Peddler"; "The Jealous Lovers"; "The Muses' Looking Glass"; "Amyntas, or the Impossible Dowry"; and "Hey for Honesty." He died in March, 1635.

RANDOLPH-MACON SYSTEM OF COLLEGES AND ACADEMIES, a group of five colleges and preparatory schools, under the Methodist Church, located in the State of Virginia. There is a college for men, the Randolph-Macon College, which has two preparatory schools leading up to it, viz.: the Randolph-Macon Academy at Bedford City, Va., and the Randolph-Macon Academy at Front Royal, Va. The system is designed to avoid loss of time and to better correlate the work of the preparatory school with the college. The college for men was founded before the Civil War, but closed during that struggle to reopen at its present location, Ashland, Va. In 1914-1915 the faculty consisted of 15 professors, and the student body numbered 190.

The Randolph-Macon Womens' College is situated at Lynchburg, Va., and its preparatory school is the Randolph-Macon Institute at Danville, Va. The college has attained a high position among the leading higher educational institutions for women, and has been more successful in securing students than the men's college. The enrollment of 1914–1915 amounted to more than 600 students, with a faculty of 45 instructors.

RANELAGH, a building erected in 1742 on the site of the gardens of a villa of the last Earl of Ranelagh at Chelsea, London, England. Its rotunda was 150 feet in diameter, with an orchestra in the center and tiers of boxes all round. The chief amusement, promenading, as it was called, was going round and round the area below, and taking refreshments in the boxes, the orchestra performing meanwhile. Ranelagh was a fashionable and notorious place of resort in 1740–1803. Its last public appearance was when the installation ball of the Knights of the Bath was given there in 1802. This building was closed the next year and torn down. Its site is now part of the Chelsea Hospital garden.

RANGE, in gunnery: (1) The horizontal distance to which a projectile is thrown. Strictly, it is the distance from the muzzle of the gun to the second intersection of the trajectory with the line of sight. A cannon lying horizontally is called the right level or point-blank range; when the muzzle is elevated to 45° it is called the utmost level. (2) A place where gun or rifle practice is carried on. In music, the whole ascending or descending series of sounds capable of being produced by a voice or instrument; the compass or register of a voice or instrument. In natural science, the geographical limits within which an animal or plant is now distributed, and the limits in point of time within which it has existed on the globe. The first is called range in space, and the second range in time. As a nautical term: (1) A length of cable a little in excess of the depth of water, ranged on deck ready to run out when the anchor is let go. (2) A large cleat in the waist for belaying the sheets and tacks of the courses.

RANGER, HENRY WARD, an American landscape painter. He was born in 1858 in western New York. He developed his technique by the study of his art in the galleries of Europe, and speedily eliminated the faults of his earlier work till he came to be looked upon as the leader of the tonal school among painters of American landscapes. "Spring Woods" in the Metropolitan Museum, New York; "Sheep Pastures" in the Pennsylvania Academy; and "Top of the Hill" in Corcoran Gallery, Washington, are among the best examples of his art. He is represented in other American museums, received gold medals at Charleston and Philadelphia, and in 1906 became National Academician. He died in 1916.

RANGOON, the capital of Lower Burma, and the chief seaport of Burma, at the junction of the Pegu, Hlaing or Rangoon, and Pu-zun-doung rivers; about 21 miles from the sea. Since its occupancy by the British in 1852 Rangoon has undergone such changes that it is practically a new town. The principal streets are broad, and contain many large and not a few handsome buildings, There are the law courts, post-offices, Bank of Bengal, custom house, Anglican and Roman Catholic churches, St. John's College, high school, etc. A large and increasing commerce is carried on with British, Indian, and Chinese ports; and an extensive trade is conducted with inland towns as far as Mandalay. The chief exports are rice, timber, cotton, hides, gums and resin, mineral oil, ivory, precious stones. Pop. about 300,000.

RANJIT SINGH, the founder of the Sikh kingdom in the Punjab, India; born in Gujranwala, Nov. 2, 1780. He was the son of a Sikh chief. After the Shah of Afghanistan had given him the province of Lahore, he directed all his energies to the founding of a kingdom which should unite all the Sikh provinces under his own personal rule. He procured from an Afghan prince, as the price of his assistance in war, the famous Koh-i-nur diamond (see DIAMOND). He died June 27, 1839.

RANK, a line of soldiers standing abreast or side by side; often used along with "file," which is a line running from

the front to the rear of a company, battalion, or regiment, the term "rank and file," thus comprising the whole body of the common soldiers.

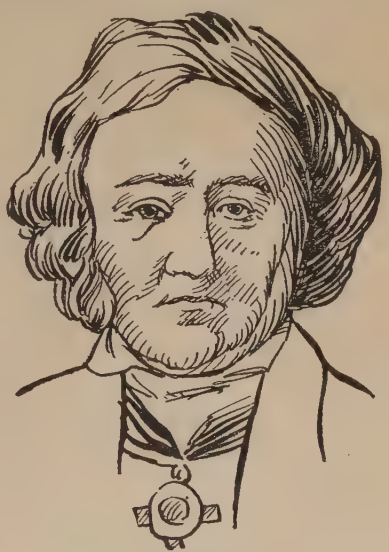
RANK, in the army and navy, a grade of various officers established by law, each one carrying distinct rights, privileges, and emoluments. Official etiquette often prescribes that certain functions shall be performed by officers of certain grades, and that an officer is entitled to have an officer of equal rank to treat with. In order to facilitate communications between officers of the United States army and navy in accordance with the principle of equality in rank, as well as to enable them to communicate with similar officers of foreign countries, a correspondence has been established between military and naval ranks. Before the abolition of the four offices the general of the army ranked equal with the admiral of the navy, and the lieutenant-general with the vice-admiral. After this the officers ranked as follows: Major-generals with rear-admirals; brigadier-generals with commodores; colonels with captains; lieutenant-colonels with commanders; majors with lieutenant-commanders; captains with lieutenants; first lieutenants with masters; and second lieutenants with ensigns. Chiefs of naval bureaus, usually captains, ranked as commodores while holding bureau assignments, and after vacating them resume their lineal rank.

If a naval officer is assigned to a duty or command that would ordinarily be given to an officer of a higher rank he is advanced to that rank, either full or acting, for the period of the assignment. A chaplain ranks as a captain of cavalry in the army, and as a captain in the navy. The superintendent of the United States Military Academy ranks as a colonel in the army, but the superintendent of the Naval Academy is not restricted to high rank; he may be a commander, captain, or rear-admiral. A flag-officer is a naval officer of sufficiently high rank to entitle him to command a fleet or a subdivision of one. Captains command ships of high rating; commodores, formerly, squadrons of not less than four ships. In the army brigadier-generals command brigades, and major-generals, divisions and corps, the last being the largest body in the army as constituted for the war with Spain.

In 1902, under several acts of Congress, the highest rank in the army was the revived one of lieutenant-general; and in the navy that of admiral, revived for Dewey. The Naval Personnel Bill abolished the rank of commodore, enlarged the number of rear-admirals, and divided the latter into two classes of nine each, the first nine ranking with major-generals and the second nine with brigadier-generals.

In order to place American officers in the World War on a level with officers of the Allies, an act was passed May 22, 1917, providing for the appointment of 3 admirals and 3 vice-admirals. In October, 1917, an act was passed reviving the title of General for two officers, the Commander of the Armies in France and the Chief of Staff of the Army.

RANKE, LEOPOLD VON, a German historian; born in Wiehe, between Gotha and Halle, Dec. 21, 1795. Though he studied theology and philology at Halle and Berlin, and in 1818 began to teach at the gymnasium of Frankfort-on-Oder,



LEOPOLD VON RANKE

his chiefest thoughts were given to the study of history. The works, "A History of the Roman and German People from 1494 to 1535" (1824) and "A Criticism on Modern Historians" (1824), procured him a call to Berlin as Professor of History in 1825. The latter of these works and "Analecta" to his subsequent books, expound his views of the functions of history, and the methods of the ideal historian. History is the record of facts. It should know nothing of the political party, or Church politics, or subjective views of the writer. It should be based on sound documentary evidence, critically examined and sifted. In 1827 he was sent by the Prussian Government to consult the archives of Vienna, Venice, Rome, and Florence; four years he spent

in this work, and returned with a mass of the most valuable historical materials. The results of his labors were seen in "The Princes and Peoples of Southern Europe in the 16th and 17th Centuries" (1827), and other books dealing with Serbia, Turkey, and Venice; and "The Roman Popes in the 16th and 17th Centuries" (1834–1837; 9th ed. 1889), perhaps the most finished of his books. Then he turned his attention to central and northern Europe, and wrote in quick succession "German History in the Early Reformation" (1839–1847); "Twelve Books on Prussian History" (1847–1848); "History of the French" (1852–1861); "English History" (1859–1867); and "German History from the Reformation to the Thirty Years' War" (1869). Later periods and special periods of German history are treated of in books on the "Origin of the Seven Years War" (2d ed. 1874); the "German Powers and the Confederation" (1871); the "History of Germany and France in the 19th Century" (1887), and monographs on Wallenstein (1869), Frederick the Great and Frederick William IV. (1878). To the above must be added a book on the revolutionary wars of 1791 and 1792 (1875), another on Venetian history (1878), and "The Universal History," of whose nine volumes (1881–1888) he lived to see only seven published. This last work, which is the copestone of Ranke's historical labors, was begun when he was an old man of 82; yet at that great age he kept two schooled historical assistants busy, studied critically the Greek and other sources, dictated and worked 8 to 10 hours a day, and published one volume a year regularly, till he died, May 23, 1886, having rested from his beloved work only a few short days. Even his long life—he was over 90 when he died—would hardly have sufficed for the thorough works he accomplished had he not been a man of unwearied industry, with a marvelous memory, and a swift and intuitive judgment as to the value of historical material. His style is not brilliant, yet sufficiently clear and interesting. He always wrote from the standpoint of one who had the whole history of the world before his mind's eye. This and his skill in the portraiture of historical personages often lend the deepest interest to his narratives. His point of view was, however, that of the statesman; and he fails to give due prominence to the social and popular sides of national development. Ranke married an Irish lady in 1843, and was ennobled in 1865. He continued to lecture till 1872. His lectures exercised a great influence upon those who sat at his feet to learn, as is seen in the works of the great school of historical writers, Waitz, Von Sybel, Giesebrecht, and others. A collected edition of his "Works" was published at Leipsic in 47 volumes in 1868. He died in Berlin, May 23, 1886.

RANNOCH, LOCH, a lake of Perthshire, Scotland, 35 miles N. N. W. of Perth, 11 miles long, and about 1 mile average breadth. It contains two islands and has an outlet for its waters in the Tummel, a tributary of the Tay.

RANSDELL, JOSEPH EUGENE, United States Senator from Louisiana; born in Alexandria, La., in 1858. He received his education at Union College in New York State. In 1883 he was admitted to the bar in Louisiana, and practiced law until his election as a Democrat to the National House of Representatives in 1899. He represented his district in Congress 13 years until he was elected to the Senate, to which body he was re-elected in 1918. Senator Ransdell vigorously opposed the Underwood-Simmons Tariff bill as he considered it unfair to the sugar interests of his State. He was also active in furthering the interests of an American Merchant Marine and for improved waterways.

RANSOM, in ordinary language, release from captivity or bondage by payment. Also the money paid for the release of a person from captivity, bondage, or slavery, or for the redemption of goods captured by an enemy. Or a price paid or offering made for procuring the pardon of sins, and the redemption of the sinner from the consequences of sin (Mark x: 45). Formerly, atonement, expiation. In feudal law, a sum paid for the pardon of some great offense, and the discharge of the offender; or a fine paid in lieu of corporal punishment.

RANSOM, THOMAS EDWARD GREENFIELD, an American military officer; born in Norwich, Vt., Nov. 29, 1834. Before the Civil War he was an engineer in Illinois; became a lieutenant-colonel of volunteers in July, 1861; was severely wounded at Fort Donelson in 1862; commanded a regiment at Shiloh in April, 1862; was promoted Brigadier-General in January, 1863; served under General Banks in the Red River expedition; and was severely wounded at Sabine Cross-Roads, La., in April, 1864. When his wound had healed he joined Sherman's army and took command of a division just before the capture of Atlanta, Sept. 2, 1864. He died in Rome, Ga., Oct. 29, 1864.

RANTERS, a name given by way of reproach to a denomination of Christians which sprang up in 1645. They called

themselves "Seekers," the members maintaining that they were seeking for the true Church and its ordinances, and the Scriptures, which were lost. The name "Ranters" is also applied to the Primitive Methodists, who formed themselves into a society in 1810, and who were in favor of street preaching.

RANUNCULACEÆ, crowfoots; an order of hypogynous exogens. Herbs, rarely shrubs, leaves often much divided, with dilated, half-clasping petioles, often with processes like stipules. Flowers typically polypetalous, large, gaily-colored, sometimes apetalous, but with colored sepals. Found in cold damp places in Europe, North America, etc. They are acrid, and often poisonous. Tribes: Clemateæ, Anemoneæ, Ranunculeæ, Helleboreæ, and Actæeæ.

RANUNCULUS, buttercup, crowfoot; the typical genus of the order *Ranunculaceæ*. Sepals five, rarely three, caducous; petals five, or more, or wanting, glandular at the base; stamens many; fruit of many achenes, each with one ascending seed. Known species about 160, from temperate regions. *R. sceleratus* was formerly used by beggars to create artificial sores; it is poisonous when raw, but is eaten boiled by the Wallachians. The juice of *R. thora* was used by the Swiss hunters to envenom their javelins. *R. glacialis* is a powerful sudorific. Many species are very beautiful, and are cultivated in gardens.

RAP, familiar in the phrase "not a rap," a counterfeit Irish coin of the time of George I., which passed for a halfpenny, though not really worth a fourth of that value. There was also a small Swiss coin called "rappen," worth a centime.

RAPE, in law, carnal knowledge of a woman by force against her will. Consent obtained by duress or threats of murder is nugatory. Rape is a felony punishable with imprisonment for life, or for a term of years, or with death.

RAPE, two species of *Brassica*. Summer rape is *B. campestris*, and winter rape *B. napus*. Sir J. Hooker regards the latter as a sub-species of the former, and the turnip as another sub-species. *B. campestris* proper has the root tuberous, the radical leaves hispid. It is the Swedish turnip. *B. napus*, the rape properly so called, has the root fusiform, and the leaves all glabrous and glaucous. It is cultivated as a salad plant, and is sometimes also used in lieu of greens. Sometimes it is called also cole seed.

RAPE CAKE, a hard cake formed by pressure of the seeds and husks of rape after the oil has been expressed. It is used for feeding cattle and sheep, and also has a high reputation as a rich manure.

RAPHAEL, RAFFAELLO SANZIO, or SANTI D'URBINO, the greatest of modern painters, and head of the Roman school; born in Urbino, Italy, March 28, 1483. He received his earliest instructions from his father, Giovanni Santi, after whose death, in 1494, he became the pupil of Perugino. In 1504 he visited Florence, and chiefly lived there till 1508, when he was called to Rome by Pope Julius II., and employed to paint the *stanze* (chambers) of the Vatican. Raphael spent the rest of his short life at Rome, where he formed a numerous school of painters, among whom the most eminent were Giulio Romano, Gian Francesco Pennis, Pierino del Vaga, Polidoro da Caravaggio, and Garofalo. In the

RAPHAEL

numerous works, frescoes, and oil paintings of this unrivaled master, three styles are distinctly recognizable. The first is the "Peruginesque," in which sentiment predominates, and was the pure imitation of his master's manner. The second is the "Florentine," marked by a great advance in respect to form and dramatic composition; it was the result of his studies at Florence; where he was impressed by the cartoons of Leonardo da Vinci and Michael Angelo, and the works of Masaccio, Francia, and

Fra Bartolomeo di San Marco. The third style is called the "Roman," and is peculiarly Raphael's own—that which constitutes him the greatest of painters. Its supreme excellence is the equable development of all the essential qualities of art, composition, expression, design, coloring. Of the paintings executed before his visit to Florence must be named "Coronation of the Virgin," now in the Vatican, and the "Sposalizio, or Marriage of the Virgin," in the Brera at Milan. Among those in his second manner are the "Entombment of Christ," in the Borghese gallery at Rome; the "Madonna del Baldacchino," in the Pitti Palace at Florence; the "Madonna del Gran Duca," in the same palace; and the grand fresco, "Theology," or "Dispute on the Saerament," the first he executed in the Vatican. "The School of Athens," or "Philosophy," painted in 1511, first showed traces of his third and highest style. It was followed by the "Parnassus," or "Poetry," "Jurisprudence," "Expulsion of Helidorus from the Temple of Jerusalem." The works of Michael Angelo in the Sistine chapel stimulated him in the production of his "Isaiah" and "Sybils"; and in 1515 he prepared the "Cartoons" for the tapestry of the Sistine chapel, three of which are lost, and the other seven, sent to Flanders, were bought by Charles I., and now form part of the National Collection in South Kensington Museum, London. Among Raphael's oil paintings are the "St. Cecilia," at Bologna; the famous "Madonna di San Sisto," now in the Dresden gallery; the "Spasimo di Sicilia," now at Madrid; and the "Transfiguration," his last work, and perhaps at once the *chef-d'œuvre* of Raphael and of painting. It is now in the Vatican. His drawings are very numerous, and are to be found in most of the public and private museums of Europe. Raphael died in Rome from the effects of a cold caught in the Vatican, on his 37th birthday, April 6, 1520.

RAPHE, in botany, the vascular cord communicating between the nucleus of an ovule and the placenta, when the base of the former is removed from the base of the ovulum.

RAPHIDES, needle-shaped transparent bodies, lying either singly or in bundles among the tissue of plants; any crystalline formation in a vegetable cell. The former commonly consist of oxalate of lime.

RAPIER, a light, highly-tempered, edgeless, and finely-pointed weapon of the sword kind used for thrusting. It is about three feet in length, and was long a favorite weapon for duels. Its use now, however, is restricted to occasions of state ceremonial.

RAPP, GEORGE, a German-American socialist, founder of the sect of Harmonists; born in Württemberg, in 1770. After an attempt to restore the Church of New Testament days in Germany, he emigrated with his followers to western Pennsylvania in 1803. There he established a settlement which he named Harmony (whence the early title of the sect, Harmonists or Harmonites). In 1815 the community removed to Indiana, and founded New Harmony; but this was sold in 1824 to Robert Owen, and Rapp and his followers returned to Pennsylvania, where they built Economy, a village on the right bank of the Ohio, 15 miles N. W. of Pittsburgh, and engaged in farming. Impressed with the certainty of the speedy second coming of Christ, his absorbing aim was to amass great wealth, to be placed then at the Lord's disposal. To this end he and his followers practiced a rigid economy, and lived a life of toil and self-denial, in which celibacy formed a part; and with the same object all things were held in common. As the years passed the community became wealthy. Its numbers, however, have not increased, and in 1890 did not exceed 70. He died in Economy, Pa., Aug. 7, 1847.

RAPP, JEAN, COUNT, a French military officer; born in Colmar, Haut-Rhin, France, April 27, 1772. He was intended for the Church, but his taste for a military life led him to enroll himself (1788) in the mounted "chasseurs" of the French army. Rapp distinguished himself by dashing gallantry in Germany and Egypt, and on the death of Desaix at Marengo he became aide-de-camp to Napoleon. His brilliant charge at Austerlitz on the Russian Imperial Guard was rewarded with the grade of general of divison (1805). For his services at Lobau he was named a count of the empire (1809). He opposed the Russian expedition, but accompanied the emperor throughout the whole of it. His obstinate defense of Danzig for nearly a year against a powerful Russian army gained for him greater renown, and his chivalrous and considerate treatment of the unfortunate inhabitants during the siege was warmly appreciated by them. The Russians, contrary to the articles of capitulation, sent Rapp and his garrison prisoners to Russia, and he did not return to France till July, 1814. On reaching Paris he was well received by Louis XVIII.; but in 1815 he went over to his old master, and was appointed Commander-in-Chief of the Army of the Rhine, and peer of France. After

Waterloo Rapp again submitted to Louis. Re-created a peer of France (1819), he held various offices about the court, and died in Baden, Nov. 18, 1821.

RAPPAHANNOCK, a river of Virginia, rising in the Blue Ridge of the Allegheny Mountains, receiving the Rapidan (above this point it is sometimes called the North Fork), and flowing about 125 miles S. E. to Chesapeake Bay. It is tidal and navigable to Fredericksburg. The Rappahannock and the Rapidan were the scenes of some of the most sanguinary battles of the Civil War, at Fredericksburg, Chancellorsville, and the Wilderness.

RAPPEE, a strong kind of snuff of either a black or brown color; it is made from the darker and ranker kinds of tobacco leaves.

RARATONGA, or **ROROTONGA**, an island in the South Pacific Ocean, belonging to Great Britain, of the group of Hervey Islands; 53 miles in circumference. It consists of a mass of mountains, becomes visible at a great distance, and has a very romantic appearance. The inhabitants have been converted to Christianity. Pop. about 3,000.

RAREFACTION, in physics, the act of rendering more rare, *i. e.*, less dense. Used specially of the diminution in the density of the air in the receiver of an air pump, or at great altitudes. It is produced by the increase in the size of the spaces between the particles of air or other gases, so that the same number of particles occupies a larger space than before rarefaction began. Called also dilatation.

RARITAN, a river of New Jersey, formed by two branches which unitedly flow S. E., and fall into Raritan Bay near Perth Amboy. It is navigable as far as New Brunswick.

RASH, an eruption or efflorescence on the skin, consisting of red patches, diffused irregularly over the body.

RASHI (from the initials of Rabbi Shelomo Izaaki, often erroneously called JARCHI), the greatest Jewish commentator and exegete; born in Troyes, France, about 1040. Philology, philosophy, medicine, astronomy, civil and ecclesiastical law, and exegesis were the chief branches of his learning; and to a rare proficiency in them he united a complete mastery over the whole range of Scripture and the Talmudical sources. In order further to perfect himself for his gigantic task he traveled for seven years, visiting the schools of Italy, Greece, Germany, Palestine, Egypt. His chief work is his "Commentary" on the whole of the Old Testament. This "Commentary"—entirely translated into Latin by Breithaupt, was the first book ever printed in Hebrew (Reggio, 1474). Of his numerous other works may be mentioned his "Commentary on the Babylonian Talmud"; a "Commentary to the Pirke Aboth"; the "Pardes, Treating of Laws and Ceremonies"; a "Commentary on Midrash Rabbah"; a "Book of Medicine"; and a "Poem on the Unity of God." He died July 13, 1105.

RASK, RASMUS CHRISTIAN, a Danish philologist; born in Brändekilde, Denmark, Nov. 22, 1787. After he had studied at the University of Copenhagen, he journeyed through Sweden, Russia, and Iceland to increase his knowledge of Northern languages, with the result that he published "An Introduction to the Knowledge of the Icelandic or Old Norse Tongue" (1811); an edition of Haldorsen's "Icelandic Dictionary" (1817); and an "Anglo-Saxon Grammar" (1817). In 1817-1822 he made, at the expense of the government, a second journey to Russia, Persia, and India. He then returned to Copenhagen in 1822, was appointed Professor of Literary History and subsequently Professor of Oriental Languages and librarian to the university. During this period he published a "Spanish Grammar," a work on the Frisian language, and a treatise on the Zendavesta, in which he showed that the language was closely akin to Sanskrit. He died in Copenhagen, Nov. 14, 1832.

RASKOLNIKS, the collective name given to the adherents of the dissenting sects in Russia, which have originated by secession from the State Church. The great majority of these sects date originally from the middle of the 17th century, when the liturgical books, etc., were revised under the patriarch Nikon. The Raskolniks clung fanatically to the old and corrupted texts, and regarded the czar and the patriarch as the representatives of Antichrist, called themselves *Staro-obryadtsy* (old ritualists) or *Staro-vertsy* (followers of the old faith). They have split up into a large number of sects, which may be grouped generally in two classes; those who have a priesthood, and those who have none. The tendency of the Raskolniks is communistic. They include about one-third of the merchant class, and nearly all the Cossacks, but none of the noble or cultivated class. Their numbers are variously estimated at from 3,000,000 to 11,000,000.

RASP, a coarse file having, instead of chisel-cut teeth, its surface dotted with separate protruding teeth, formed by the indentations of a pointed punch. It is used almost exclusively on comparatively

soft substances, as wood, horn, and the softer metals. Also a raspberry.

RASPBERRY, a shrubby plant with many suckers. Found in America and in the N. of Europe and Asia. The species in gardens is the wild plant, greatly improved by cultivation. The fruit resembles the strawberry in not becoming acid in the stomach. There are red and yellow varieties.

RASPUTIN (NOVIKO), GREGORY, a Russian monk and political intriguer, born in Siberia, of illiterate parents, his father being a fisherman. He received no schooling, and was known throughout his youth as a worthless fellow, on which account he became known as "Rasputin," meaning a vagabond. In early manhood he became an itinerant monk, and developed peculiarly strong psychic powers, which enabled him to gain a livelihood as a mystic healer. He eventually attracted the attention of Madam Virubova, the favorite lady-in-waiting of the Empress, who introduced him into the court. Here his healing powers, exercised over the young Czarevitch, deeply impressed the Czarina, and Rasputin thereby gained an influence over her which could not be broken. After the outbreak of the war, in 1914, Rasputin, it was said, was bribed by the Germans, to exercise his influence at court in favor of bringing about a premature peace. That he was at the head of the intriguing pro-German clique in the Russian Court is beyond dispute. So powerful became his influence over the Czarina and the Czar, that even the Grand-Dukes were turned against him, and sought to eliminate him. This proving impossible, he was finally inveigled into the residence of Prince Felix Yusopov, a relative of the Czar by marriage, and killed by a group of men, one of whom was Grand-Duke Dimitri Pavlovitch, ex-Minister of the Interior. Rasputin's work had been done, however, and the machinery he set in motion finally caused the revolution of March, 1917, the result of which was the overthrow of the autocratic government. Died 1917.

RASSAM, HORMUZD, a Turkish Assyriologist; born in Mosul, Mesopotamia, in 1826. He gained the friendship of Layard, and assisted him in his excavations at Nineveh in 1845–1847 and 1849–1851, and then succeeded him, till 1854 as British agent for conducting Assyrian explorations. His grandest success was the finding of the palace of Assurbani-Pal (Sardanapalus). After holding in the following years political offices at Aden and Muscat, he was sent (1864) by the British Government to Abyssinia, to demand the release of the Europeans kept in prison by King Theodore; but that potentate cast him also into prison and only released him with the rest of his captives after his army had been defeated by Sir R. Napier in 1868. From 1876 to 1882 Rassam was employed by the trustees of the British Museum in making explorations in Mesopotamia, and discovered Sepharvaim (Sippara) and Kuthah. He published "The British Mission to Theodore, King of Abyssinia" (1869). He died in 1910.

RASSE, a carnivorous quadruped, closely allied to the civet, spread over a great extent of Asia, including Java, various parts of India, Singapore, Nepâl, and other localities. Its perfume, which is secreted in a double pouch like that of the civet, is much valued by the Javanese.

RASTATT, or **RASTADT**, a town and first-class fortress in Baden; on the Murg, 3 miles from its junction with the Rhine, and 15 miles S. W. of Carlsruhe. Steel wares, beer, and tobacco are manufactured. From 1725 to 1771 the town was the residence of the Margraves of Baden-Baden. The present fortifications were erected in 1840-1848 by Austrian engineers to protect the N. entrance to the Black Forest. Rastatt is memorable for two congresses—the first in 1714, when a treaty of peace, which brought the war of the Spanish Succession to a close, was signed between Marshal Villars and Prince Eugene; and the second in 1797-1799. On the breaking up of this latter congress without any definite result the three French plenipotentiaries set out for Strassburg; but they had scarcely got beyond the gates of Rastatt when they were attacked by Austrian hussars, and two of the three slain, while the third was left for dead in a ditch. Their papers were carried off, but no further spoil was taken. It seems that the Archduke Charles gave orders to the hussars to drive the French representatives out of Rastatt and take away their papers; the killing was the work of the officers, misunderstanding their orders. The town played a prominent part in 1849 as the stronghold of the revolutionists in Baden. Pop. about 16,000.

RASTRITES, in palæontology, a genus of Graptolites or Rhabdophora. The polypary consists of a slender axial tube, having on one side a row of cellules, or hydrothecæ, separate and not overlapping. The typical species is *R. peregrinus*, which, with *R. triangulatus*, is found in the S. of Scotland. Etheridge makes a zone of *R. peregrinus* in the Upper Birkhill or Gray Shale group of the Lower Llandovery. Found also in Bo-

hemia (where it is said to extend to the Upper Silurian), in Saxony, etc.

RAT, in zoölogy, a name popularly applied to the larger murines, but more strictly applicable to two species, the English black rat (*Mus rattus*), and the brown, or Norway rat (*M. decumanus*). The former is a small, lightly built animal, about seven inches long, with a slender head, large ears, and a thin scaly tail longer than the body. In temperate climates the color is a bluish-black lighter on the belly. The species is represented in warmer climates by the Alexandrian rat (*M. alexandrinus*, better known as *M. rattus rufescens*), with a gray or reddish back, and white

AUSTRALIAN KANGAROO RAT

under-surface. By later naturalists it is considered as only a variety. The albino and pied rats, kept as pets, also belong to this species, which had its home in India and penetrated thence to almost every part of the world, driving out the native rats, and to be, in its turn exterminated by the brown rat (probably a native of China, where a similar species, *M. humiliatus*, is still found). The brown rat is much more heavily built than the black rat, grayish-brown above and white beneath; ears, feet, and tail flesh-colored. Melanism often occurs, but such animals may be readily distinguished by ordinary specific differences from the true black rat. Length of head and body eight or nine inches long, tail shorter. Both the species are omnivorous, predaceous, and extremely fecund, breeding four or five times in the year, the female producing from 4 to 10 blind, naked young, which breed in their turn at about six months old. *M. fuscipes* is the brown-footed rat of Australia; *Nesokia bandicota*, the bandicoot, or pig rat; and *N. bengalensis*, the Indian field rat. Figuratively: (1) One who deserts his party (especially in politics), as rats are said to forsake a falling house or a doomed ship. (2) A workman who takes work for less than the regular wages current in the trade; also a workman who takes employment at an establishment where the regular hands have struck; a term of opprobrium applied to non-union men by members of trades unions; specifically to non-union printers.

RATA (*Metrosideros robusta*), a New Zealand tree related to various species of ironwood. The seed is believed to be swallowed by a caterpillar, and to sprout in its interior, the fostering grub being of course killed. The tree begins life as a climber, attached to other forest trees, and attains a height of 150 feet; but when it has killed the supporting stem the rata is able to sustain its own weight and to grow on as an independent tree, attaining ultimately a height of nearly 200 feet. The wood is very hard, formerly much used for making clubs, and is valuable for shipbuilding.

RAT-BITE FEVER, an infection arising probably from a spirochete, present in the blood of about 3 per cent. of house rats, and consequently called spirochæta morsusmuris by Japanese specialists. The spirochetal theory is supported by the efficacy in the fever of salvarsan, which is known to have a remedial effect in spirochete cases.

RATCHET, in machinery, the detent which prevents the backward motion of a racket wheel.

RATCHET WHEEL, a wheel having inclined teeth for receiving a ratchet or detent, by which motion is imparted or arrested. The teeth are of such shape as to revolve and pass the detent in one direction only. The detent may be a pallet or a pawl. The former receives an intermittent rotation by a reciprocating circular movement of the arbor and its cam. Sometimes the wheel is intermittingly rotated by the motion of one pawl, while the other one acts as a detent in the intervals between the forward motions of the former.

RATCHET WRENCH, a wrench operated by a ratchet and pawl, so that it may be turned continuously without removal from the bolt or nut to which it is applied, by a backward and forward movement of the handle.

RATCHMENT, in architecture, a kind of flying buttress which springs from the principals of a herse, and meets against the central or chief principal.

RATEL, the genus *Mellivora*. Two species are usually distinguished, *M. indica*, the Indian, and *M. ratel*, the Cape ratel. The body is stout and heavily

built, legs short and strong, with long curved fossorial claws, tail short, earconches rudimentary. General coloration iron-gray on the upper, and black on the lower surface, reversing the general plan of coloration, which is generally lighter on the under surface. A marked white stripe divides the gray of the upper parts from the black in the Cape ratel, which is said to live principally on honey. Jerdon says that *M. indica*, which he calls the Indian badger, is found throughout India, living usually in pairs and eating rats, birds, frogs, white ants, and various insects; and in the N. of India, where it is accused of digging out dead bodies, it is popularly known as the grave-digger. It doubtless also, like its Cape congener, occasionally partakes of honey and is often very destructive to poultry. In confinement it is quiet, and will eat fruits, rice, etc.

RATHENOW, a town of Prussia, on the right bank of the Havel (here crossed by a stone bridge), 43 miles W. by N. of Berlin. Optical instruments, wooden wares, machinery, bricks and tiles, are made. Pop. about 25,000.

RATHLIN, a crescent-shaped island off the coast of Antrim, 6½ miles N. of Ballycastle. Area, 3,398 acres. St. Colomba established a church here in the 6th century; and Bruce in 1306 took refuge in a castle, now a ruin.

RATIBOR, a town of Prussian Silesia; on the left bank of the Oder, 44 miles S. S. E. of Oppeln It is the chief town of the principality of Ratibor, which, a sovereign duchy from 1288 to 1532, has since 1742 been subject to Prussia. The town manufactures tobacco, shoes, paper, glass, sugar, furniture, etc., and has large ironworks. Pop. about 40,000.

RATIFICATION, in law, the confirmation, sanction or approval given by a person who has arrived at his majority to acts done by him during his minority. It has the effect of giving validity to such acts as would be otherwise voidable. Ratification by a wife, in Scotch law, a declaration on oath made by a wife before a justice of the peace (her husband being absent) that the deed she has executed has been made freely.

RATIO, in law, an account; a cause, or the giving judgment therein. In mathematics: (1) The measure of the relation which one quantity bears to another of the same kind; that is, it is the number of times that one quantity contains another regarded as a standard. This is found by dividing the one by the other. The quotient or ratio thus obtained is the proper measure of the relation of the two quantities. Some writers define the ratio of one quantity to another as the quotient of the first quantity divided by the second, while others define it as the quotient of the second divided by the first. Thus, the ratio of 2 to 4, or of a to b, may be taken either as $2 \div 4$ or $4 \div 2$, and $a \div b$ or $b \div a$. In every ratio there are two quantities compared, one of which is supposed known, and is assumed as a standard; the other is to be determined in terms of this standard. These quantities are called terms of the ratio; the first one, or that which is antecedently known, is called the antecedent, and that whose value is to be measured by the antecedent, is called the consequent. Ratios are compared by comparing the fractions; thus, the ratio of 8:5 is compared with the ratio of 9:6, by comparing the fractions ⅝ and ⅔; these fractions are respectively equal to $^{48}/_{30}$ and $^{45}/_{30}$ and since $^{48}/_{30}$ is greater than $^{45}/_{30}$, the ratio of 8:5 is greater than that of 9:6. Ratios are compounded together by multiplying their antecedents together for a new antecedent, and their consequents together for a new consequent; thus the ratio of $a:b$, compounded with that of $c:d$, is $ac:bd$. Proportion is the relation of equality subsisting between two ratios. See PROPORTION. (2) A name sometimes given to the rule of three in arithmetic.

Compound ratio: (*a*) The ratio of the product of the antecedents of two or more ratios to the product of the consequents: thus if 3 : 6 : : 4 : 12, then 12:72 is the compound ratio. (*b*) When one quantity is connected with two others in such a manner that if the first is increased or diminished, the product of the other two is increased or diminished in the same proportion, then the first quantity is said to be in the compound ratio of the other two.

Direct ratio, two quantities are said to be in direct ratio when they both increase or decrease together, and in such a manner that their ratio is constant.

Duplicate ratio, when three quantities are in continued proportion, the first is said to have to the third the duplicate ratio of that which it has to the second, or the first is to the third as the square of the first to the square of the second.

Inverse ratio, two quantities or magnitudes are said to be in inverse ratio, when if the one increases the other necessarily decreases, and, *vice versa*, when the one decreases the other increases.

Mixed ratio or proportion: a ratio or proportion in which the sum of the antecedent and consequent is compared with the difference of the antecedent and consequent. Thus, if $a:b::c:d$, *then* $a+b$:

$a—b::c+d:c—d$ is the mixed ratio or proportion.

Prime and ultimate ratios, a method of analysis, devised and first successfully, employed by Newton in his "Principia." It is an extension and simplification of the method known among the ancients as the method of exhaustions. To conceive the idea of this method, let us suppose two variable quantities constantly approaching each other in value, so that their ratio continually approaches 1, and at last differs from 1 by less than any assignable quantity; then is the ultimate ratio of the two quantities equal to 1. In general when two variable quantities, simultaneously approach two other quantities, which, under the same circumstances, remain fixed in value, the ultimate ratio of the variable quantities is the same as the ratio of the quantities whose values remain fixed. They are called prime or ultimate ratios, according as the ratio of the variable quantities is receding from or approaching to the ratio of the limits. This method of analysis is generally called the method of limits.

Extreme and mean ratio, in geometry, the ratio where a line is divided in such a manner that the greater segment is a mean proportional between the whole line and the lesser segment: that is, that the whole line is to the greater segment as that greater segment is to the less.

Composition of ratios, the act of compounding ratios.

Ratio of a geometrical progression, the constant quantity by which each term is multiplied to produce the succeeding one. To find the ratio of a given progression, divide any term by the preceding one.

Ratio of exchange, a phrase used in political economy to denote the proportion in which a quantity of one commodity exchanges for a given quantity of another. The expression can never be used with any degree of accuracy, except in those cases where the commodities are homogeneous in quality, and susceptible of weight or measurement, as in the exchange of gold for silver, copper, iron, etc., or that of wheat for barley, oats, etc.

RATION, a stated or fixed amount or quantity dealt out; an allowance. Specifically, rations are the allowance of provisions given out to each officer, noncommissioned officer, soldier, or sailor.

RATIONALISM, as a "system of belief regulated by reason," might be expected to mean the opposite of irrationality, crass ignorance, and perverse prejudice; and the rationalism would then mean the progress of civilization, the development of the intellectual and moral nature of men and nations. It is nearly in this sense that Lecky uses the word; attributing to its wholesome influence the decay of the belief in magic, witchcraft, and other hideous superstitions, and the substitution of a kindly tolerance in place of blind zeal for persecution.

But in ordinary English usage, general as well as theological, the connotation of the word is substantially different. It is generally employed as a term of reproach for those who, without utterly denying or attempting to overthrow the foundations of religion, make such concessions to the enemy as tend to subvert the faith; who admit the thin end of a wedge that pressed home will rend and destroy the fabric. They rely, more or less exclusively and blameworthily, on mere human reason instead of simply, frankly, and fully accepting the dicta of the divine word. An atheist would not be spoken of as a rationalist, nor would an irreligious, blaspheming freethinker. Rationalists in ordinary parlance are those who are more "liberal" or "advanced" than the main body of the orthodox; in especial those who take a "low" view of inspiration, and minimize or explain away the miraculous details of the history of revelation and redemption. Rationalism is not so much a body of doctrine as a mood of mind, a tendency of thought shown in the attempt to apply to religious doctrine, the sacred story, and the sacred Scriptures the same methods of research and proof as are used in mere human science and history, and the literatures of all times and peoples. This feature is also recognized, though with approval, by Lecky in his wider use of the word: "Rationalism," he says, "leads men on all occasions to subordinate dogmatic theology to the dictates of reason and conscience. . . . It predisposes men in history to attribute all kinds of phenomena to natural rather than to miraculous causes; in theology to esteem succeeding religious systems the expression of the wants and aspirations of that religious sentiment which is implanted in man; and in ethics to regard as duties only those which conscience reveals to be such." Rationalism, not being a system but a temper or drift of mind, has different aims at different times; just as "liberalism" in politics was not the same thing before 1832 as it came to be after, or in 1832 what it was in 1867, 1885, or 1900. Opinions are heard in sermons and expounded in books by theological professors in 1902 without proving serious stumblingblocks to the majority, which in 1860 would by all but

a small minority have been regarded as distinctly rationalistic. Thus, till lately it was alarming rationalism to dispute the Mosaic authorship of Genesis, the Solomonic authorship of the Song of Songs, and the Davidic authorship of any of the Psalms, now the newer view is assumed by many orthodox teachers. And in the last quarter of the 19th century scholars earnestly supported views which they themselves treated as highly dangerous 20 or 30 years earlier. Rationalism of this kind is a transition stage, but not necessarily a transition to unbelief.

The rationalistic temper may be traced in almost every age of the Church's history; no doubt the extremer representatives of the Petrine party in sub-apostolic times regarded Paul's views as lax and rationalistic. If the Reformation was not rooted in rationalism (as to Catholics it seems to have been), many of the contentions of the reformers were such as all rationalists accept and sympathize with. Zwingli was a rationalist to Luther and the Lutherans; Socinus was of course a rationalist of an extreme type. The dry and barren dogmatic orthodoxy of Germany in the 17th century fostered a rationalism as cold and unspiritual. In the England of the 18th century, during the deistic controversies, the Evangelicals of Germany thought, not altogether unjustly, that some of the most conspicuous opponents of the deists were not themselves free from the charge of rationalism; and the Evangelicals of Scotland regarded the "moderates" of the 18th century, however orthodox in dogma, as thoroughly rationalistic in spirit. Rationalism is not so much opposed to orthodoxy as to the mysticism, and what was called variously fanaticism, enthusiasm, "high-flying," and methodism. A soulless orthodoxy has not seldom been opposed by a fervent piety that by a not unnatural antithesis has tended to run into heretical extremes; while, on the other hand, actual rationalists have often been foremost among the champions of religion, and of revealed religion, against radical freethinking, deism, naturalism, and materialism.

In Germany the term rationalism is more definite in its reference than in England, but is not always used in quite the same sense. The two defective and mutually opposed schools of thought that Kant sought to supersede by his critical philosophy were, on the one hand, a shallow empiricism, and on the other, a baseless and overweening metaphysical dogmatism or rationalism. Bacon also contrasted empirical philosophers with rationalists who spin their systems as spiders do cobwebs, out of their own bowels. Wolff presents the most conspicuous example of the philosophical rationalism which held that all that is in heaven above and earth beneath could be "proved" by pseudo-mathematical methods; and as God, responsibility, and immortality were among the things that could be proved at endless length and in various ways, this philosophical rationalism led directly up to a rationalist theology, which consisted mainly in a series of dogmas to be demonstrated from the philosophical axioms, including some at least of the doctrines of revealed religion. What in revelation could not be demonstrated according to this scheme was disallowed or explained away. Practical religion became, in the *Aufklärung*, a system of mere utilitarian morals.

Kant prepared the way for a deeper view of man, history, and the universe; but his own explicit statements on positive religion were pronouncedly rationalistic; and the negative side of his philosophy was well calculated to lay the foundations of another school of theological rationalists (often called vulgar rationalism), of whom Tieftrunk (died 1837), Bretschneider (1776–1848), and Wegscheider (1771–1849) may be taken as representatives. De Wette (1780–1849) shows the transition to Schleiermacher, who (though in the English sense of the word he was an outspoken rationalist) combined what was best in the opposing schools of rationalists and supernaturalists, founded a higher and truer religious philosophy, and heralded even the "pectoral theology" of the mediation school.

But it was not in the sphere of speculation and dogma, but in that of Biblical criticism, that German rationalism accomplished its main work, and left its deepest mark on subsequent theological development. In the early 18th century the "Germans in Greek were sadly to seek," as English scholars thought; Germans themselves admitted that in studying the Scriptures they failed to escape from dogmatic presuppositions, and that it was the English divines who approached the New Testament in a historical spirit, which in the Germany of that day caused misgivings. It is noteworthy that Semler (1725-1791), "the father of rationalism," obtained the doctorate for a thesis written against Whiston, Bentley, and other English scholars in defense of the "three heavenly witnesses" of I John, v: 7. Semler in the schools, supported by Lessing and Herder in literature, was soon teaching that the books of the Bible must be studied as human productions: Eichhorn (1752–1827) thoroughly

accepted and applied that principle. Rationalist criticism was carried to an absurd length by Paulus (1761-1851), who taught that the Gospels contained natural and not supernatural events, and whose most ingenious but inept "explanations" of the miracles of the New Testament, "retaining everywhere the husk but surrendering the religious kernel," were made a laughingstock by Strauss. Strauss' "mythical theory" (excessively rationalist in the English sense of the term) was in its turn superseded by Baur, and the new Tübingen school, whose epoch-making work marks the opening of the most recent period in Scriptural criticism. The "notes" of the newer criticism, whether more or less rationalist from the older English point of view, are the conviction that all truth is one, whether derived from the natural sciences, historical research, the dictates of conscience, or the records of divine revelation, and the willingness to accept what is apparently established by the consensus of scholars even where this involves giving up the belief in the inerrancy of Scripture. Many of the contentions of self-confident and aggressive rationalism have long since mutually destroyed one another. Nothing can be more contrary to the true historic and scientific spirit than the assumptions of a reckless sciolism: there is a false and a true rationalism; and it should be remembered that much that is now most surely believed by all has at one time or another been branded as rationalistic.

RATISBON (German Regensburg), a city of Bavaria, on the Danube, opposite the influx of the Regen, 67 miles from Munich. Though built of stone, it has all the defects of an old town. The best edifices are the cathedral, and the palace of the Prince of Thurn and Taxis, formerly the abbey of St. Emmeran, containing many good paintings; the town house, in which the diet of the empire was held from 1662 to 1806; the episcopal residence, the arsenal, and the Haidplatz, where tournaments were given in the days of chivalry. Manufactures tobacco, porcelain, leather, and steel wares; also extensive dockyards for the building of boats and lighters. In 1524 the Roman Catholics here formed a league against the Protestants; and here, in 1809, Napoleon I. was wounded in a battle in which he forced the Austrians to retreat. Ratisbon was made a free port in 1853. Pop. about 55,000.

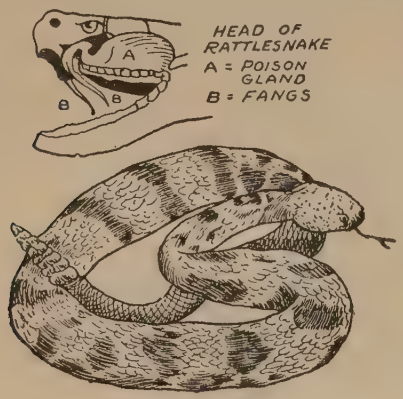
RATITÆ, a division of birds. They are all incapable of flight; though some run very swiftly, the abnormally small wings acting as a kind of sail, and helping the birds along. They may be divided into two groups: (1) Those in which the wing has a rudimentary or very short humerus, and not more than one ungual phalanx (the *casuariidæ*, the fast-vanishing *Apterygidæ*), and the extinct *Dinornithidæ*, often treated as one family (*Apterygidæ*); and (2) those having a long humerus and two ungual phalanges (*Rheidæ* and *Struthionidæ*, often combined under the latter name).

RAT SNAKE, *Ptyas mucosus*, a powerful snake, attaining a length of seven feet and upward. Common in India and Ceylon, scarce in the Archipelago. It frequently enters houses in search of mice, rats, and young fowls. It is fierce, and always ready to bite.

RATTAN, the commercial name for the stem of various species of the genus *Calamus*. They abound in southern Asia in moist situations, and are used for making splints for chair seats and backs, hanks for sails; cables, sometimes as much as 42 inches round; cords, withes, and walking sticks; also for making splints for baskets and brooms, fish weirs, hurdles, hoops, carriage seats, and many other purposes. The larger species grow to a size of three inches diameter, and to a height of 100 feet.

RATTAZZI, URBANO, an Italian statesman; born in Alessandria, Italy, June 29, 1808. He studied law at Turin and practiced as an advocate with great success at Casale. After the proclamation of the constitution in 1848 he was elected member of the Second Chamber for Alessandria, and began his political career as a democrat. Gioberti made him minister of the interior and later of justice; but after the defeat of Novara he was obliged to retire with the rest of the ministry. When Napoleon III. threatened the liberty of Piedmont, Cavour, Rattazzi, and their parties joined together to defeat his schemes, and in 1853 Rattazzi took the portfolio of Justice under Cavour, and presented the bill for the abolition of convents. Being accused of weakness in suppressing the Mazzinian movement in 1857, he retired from office early in the following year. In 1859, however, he was back again in office as Minister of the Interior. The threatened cession of Savoy and Nice, which he opposed, led to his retirement in 1860. Having changed his views on this point, he was in March, 1862, intrusted with the formation of a new ministry, but had to resign at the end of the year in consequence of his opposition to Garibaldi; and once more prime minister for six months in 1867, he lost the post for the same reason. He died in Frosinone, June 5, 1873.

RATTLESNAKE, the English name for any species of the American genus *Crotalus*, the tail of which is furnished with a rattle. Garman enumerates 12 species and 13 varieties, falling into two groups: (1) Having the upper side of the head covered with nine dermal shields; (2) having the shields behind the eyes broken up or replaced by small scales. The second group comprises the more formidable kinds, generally described as *C. horridus* and *C. durissus*. The first name was formerly applied to



RATTLESNAKE

the reptile extending from Paraguay and Chile through Brazil, into Mexico, and the latter to the North American rattlesnake. In recent American works this nomenclature is reversed. The poison of the rattlesnake is usually fatal to man, though fortunately they are sluggish, and never attempt to strike unless they are molested. They are widely distributed on the American continent.

RATTLESNAKE ROOT, a name for *Polygăla Senega*, an American plant used to cure the bite of the rattlesnake.

RATTLESNAKE WEED, the American plant *Eryngium virginicum*, used as a cure for the bite of the rattlesnake.

RAVANA, in the Hindu religious system, the name of the Râkshasa who, at the time of Râma, ruled over Lankâ or Ceylon, and having carried off Sîtâ, the wife of Râma, to his residence, was ultimately conquered and slain by the latter. He is described as having been a giant with 10 faces, and in consequence of austerities and devotion, as having obtained from Siva a promise which bestowed on him unlimited power, even over the gods. As the promise of Siva could not be revoked, Vishnu evaded its efficacy in becoming incarnate as Râma, and hence killed the demon giant.

RAVELIN, in fortification a detached work having a parapet and ditch forming a salient angle in front of the curtain. It is erected on the counterscarp, and receives flank defense from the body of the place. Inside the ravelin may be a redoubt and ditch; the gorge is unprotected, and the ravelin may be considered a redan on the counterscarp.

RAVEN, the genus *Corvus*, and especially *C. corax*, one of the largest of the Passerines. It is about 26 inches long, plumage black, glossed with steel-blue and purple; very widely distributed in the Northern Hemisphere. The raven has played an important part in mythology and folk-lore. It is the first bird mentioned by name in the Old Testament (Gen. viii: 7); by the ministry of ravens Elijah was fed (I Kings xvii: 6), and they were to be the ministers of vengeance on unruly children (Prov. xxx: 17). The raven was the bird of Odin, and in classic mythology was of ill-omen, a character often attributed to it by the early English dramatists. Marlowe calls it the "sad presageful raven," and Shakespeare repeatedly refers to the belief that its appearance foreboded misfortune. This belief, which is widespread, probably arose from the preternaturally grave manner of the bird, its sable plumage, and the readiness with which it learns to imitate human speech.

RAVENALA, or **RAVINALA**, a genus of *Uraneæ*. The *U. speciosa* is a fine banana-like tree with edible seeds, from Madagascar, where the French call it he traveler's tree, perhaps because water is found in the cup-like sheaths of the leaf-stalks.

RAVENNA, an important city and province of central Italy, 43 miles E. S. E. of Bologna, and 4½ miles from the Adriatic. It is situated in the midst of a well-watered, fertile, and finely wooded plain, and is surrounded by old bastions, and by walls where may still be seen the iron rings to which the cables of ships were formerly fastened; the sea is now at the distance of about 4 miles from the city. The streets are wide; the squares are adorned with the statues of the Popes. The cathedral, built in the 4th century, was almost wholly rebuilt in 1734. Of the other 14 churches and other architectural antiquities several date from the 5th and 6th centuries. San Francesco possesses the tomb of Dante, erected in the 15th century. The library of Ravenna contains 50,000 volumes. It has an archæological museum, and many educational institutions. Ravenna has manufactures of silk, and its trade is facilitated by a canal to the

sea. The city was probably of Umbrian origin. Augustus made it a first-class seaport and naval station; 400 years later the Emperor Honorius took refuge there, and made it the capital of the empire. In 1218 it became a republic. In 1275 Guido da Polenta conducted it, and there established his court, where he received Dante. Ravenna was afterward taken by the Venetians, who kept it till 1509. Under Charles V. it passed into the hands of the Popes. Under its walls a great battle was fought in 1512 between the French and the Spaniards, in which Gaston de Foix purchased victory with his life. Pop., city, about 75,000; province, about 260,000.

RAVIGNAN, GUSTAV FRANÇOIS XAVIER DELACROIX DE, a French Jesuit preacher; born in Bayonne, France, Dec. 2, 1795; was professor at Montrouge, and became famous in 1837 as preacher at Notre Dame in Paris. He published an Apology of his order in 1844, and in 1854 a more lengthened work with the same view, "Clement XIII. and Clement XIV." He died Feb. 26, 1858.

RAWALPINDI, a town and important military station of the Punjab, India, between the Indus and Jhelum rivers, 160 miles N. W. of Lahore. There are an arsenal (1883), a fort, a fine public park, and several European churches. The place carries on an active transit trade with Kashmere and Afghanistan. Here the Sikhs surrendered after their defeat at Gujrat (1849), and here too was held, in 1885, a great durbar or review, at which the Ameer of Afghanistan met Earl Dufferin, governor-general of India. Pop., district, about 4,500,000; town, about 90,000.

RAWA RUSSKA, BATTLE OF, a series of engagements of the first magnitude between the Russian and Austrian armies, beginning Sept. 8, 1914, and lasting eight days, taking its name from a small city in Galicia, inhabited chiefly by Jews. About 250,000 men on both sides were engaged during the first few days, added re-enforcements bringing the number up to fully 300,000 during the later phase of the fighting. The Austrians were disastrously defeated.

RAWLINS, JOHN AARON, an American military officer; born in Galena, Ill., Feb. 13, 1831. Before the Civil War he was a lawyer; adjutant-general of General Grant in September, 1861, and served as such in the campaigns of 1862 and 1863; in March, 1865, was appointed chief of General Grant's staff, with the rank of Brigadier-General in the U. S. A. He became Secretary of War in March, 1869. He died in Washington, D. C., Sept. 9, 1869.

RAWLINSON, GEORGE, an English Orientalist; born in Chadlington, England, Nov. 23, 1812; educated at Cambridge; preached the Bampton Lectures in 1859; was elected Camden Professor of Ancient History in 1861, and made a canon of Canterbury in 1872. He published a translation of Herodotus with a commentary (1858–1860); "The Five Great Monarchies of the Ancient Eastern World" (1862–1867), followed by the Sixth (1873) and the "Seventh Oriental Monarchy" (1876); "History of Ancient Egypt" (1881); "Egypt and Babylon" (1885); "Phœnicia" (1889); "Memoir of Gen. H. C. Rawlinson" (1898). He died in 1902.

RAWLINSON, SIR HENRY CRESWICKE, an English Orientalist and diplomatist; born in Chadlington, England, April 11, 1810; entered the East Indian Company's army in 1827. In 1833 he went to Persia to assist in organizing the Persian army. During the six years he spent there he began to study the cuneiform inscriptions, and made a translation of Darius' famous Behistun inscription, which he published in the "Journal of the Royal Asiatic Society." After he left Persia he held command of Kandahar during the troublous times of 1840–1842 (see AFGHANISTAN); was appointed political agent at Bagdad in 1844, and consul-general there in 1851. Five years later he returned home to England, was made K. C. B., and appointed by the crown director of the East India Company. In 1858 he went back to Persia as British minister, but remained at Teheran only one year. Appointed a member of the Council of India in 1868, he was nominated its vice-president in 1876. Other public positions he held—the presidency of the Royal Geographical Society (1871); a trusteeship of the British Museum (1879); a directorship of the Royal Asiatic Society. He was made a baronet in 1891. He wrote: "A Commentary on the Cuneiform Inscriptions of Babylon and Assyria" (1850); "Outline of the History of Assyria" (1852); "The Cuneiform Inscriptions of Western Asia"; "England and Russia in the East" (2d ed. 1875); etc. He died in London, March 5, 1895.

RAWLINSON, BARON HENRY SEYMOUR, a British military officer. He was born in 1864, at Knoyle, Wilts, and was educated at Eton, Sandhurst, and the Staff College, Camberley. In 1884 he entered the 60th K. R. Rifles, and in 1887 was A. D. C. to Sir Fred-

erick Roberts, Commander-in-chief in India. He served with the Mounted Infantry, Burma campaign (medal and clasp). He returned to England in 1889 and exchanged into Coldstream Guards in 1892. He served in the Soudan campaign in 1898 and was present at the battles of Atbara and Khartoum. He served in the South African War at Ladysmith in 1900 and commanded a mobile column 1901-1902. In the World War he was mentioned in dispatches twice in 1914–1915, and was promoted major-general in 1917, serving in Montenegro. He has published "The Officers' Note-Book."

RAWSON, EDWARD KIRK, an American educator; born in Albany, N. Y., Feb. 21, 1846; was graduated at Yale University in 1868 and at the Andover Theological Seminary in 1872; was ordained in the Congregational Church and served as a chaplain in the United States navy in 1871–1890; was placed in charge of the Department of Ethics and English Studies at the United States Naval Academy in 1888 and was made superintendent of "Naval War Records," March 31, 1897. His publications include "Twenty Famous Naval Battles"; "Salamis to Santiago" (1899); and essays including "Anarchic Socialism"; "New Englander" (1884); "The Naval Chaplaincy" (1892); "The Rationale of Russian Socialism"; (1888); "Twenty Famous Battles" (1899); etc.

RAY, of a composite flower, the outer or circumferential whorl of florets, as distinguished from those of the disk. In many composites the former are ligulate and the latter tubular. Medullary rays are vertical plates radiating from the pith to the bark through the wood of exogenous stems. In the cross section, the medullary rays constitute fine radiating lines; in a longitudinal section, they impart to the wood a satiny luster, which in the plane, the sycamore, etc., is so marked as to be highly beautiful. The medullary rays maintain a connection between the bark and the central part of a stem. Carpenters call medullary rays the silver grain.

In ichthyology, one of the radiating, bony rods serving to support the fins. They are of three kinds; (1) Simple; (2) Articulated (showing more or less numerous joints); and (3) Branched (dichotomically split, the joints increasing in number toward the extremity). The differences in the character of the rays in the dorsal fin are an important factor in classification. In optics, etc., a line of light proceeding from a radiant point, or a point of reflection. A collection of rays is called a pencil. An incident ray entering a doubly-refracting crystal is resolved into two, called from their properties an ordinary and an extraordinary ray. The term ray is used also of one of the component elements of light, as the violet rays of the spectrum; or the luminous, actinic, or heat rays: Visual ray, in perspective, a straight line drawn through the eye.

RAY, in ichthyology, any individual of the genus *Raja;* but the family *Rajidæ*, and even the section *Batoidei*, are often spoken of as rays. Their flattened shape indicates that they live on level sandy bottoms, generally at no great distance from the coast and in moderate depths. They are carnivorous, but by no means active, swimming like the flatfishes by the undulating motion of the pectoral fins, the thin flagelliform tail having entirely lost its locomotive function, and serving merely as a rudder. They may be divided into two groups: (1) rays proper, with a short snout, and (2) skates (attaining a much larger size) with a long, pointed snout. In species armed with bucklers or asperities it is the female which has these dermal developments, the male being entirely or nearly smooth. The color also frequently varies in the sexes. The *Myliobatidæ* are popularly known as eagle rays, the *Torpedinidæ* as electric rays, and the *Trygonidæ* as sting rays.

RAY, or WRAY, JOHN, an English naturalist; born in Black Notley, Essex, England, Nov. 29, 1628. From Braintree free school he went to Cambridge, where he was fellow, Greek lecturer, mathematical tutor, and junior dean in Trinity College, but after a time began to devote himself entirely to the study of natural history. At the Restoration he accepted Episcopal ordination, but was ejected by the "Black Bartholomew" (1662). Thereupon, accompanied by a kindred spirit, Francis Willughby, Ray traveled over most of the United Kingdom, collecting and investigating botanical and zoölogical specimens; and in 1663 they started on a tour through the Low Countries, Germany, Italy, and France, with a similar object. In 1667 Ray was elected a Fellow of the Royal Society. After several changes of residence, in 1679 Ray settled down in his native village. As a botanist and zoölogist he ranks very high, the classification of plants which he proposed being practically in the main the foundation of what is now known as the "Natural System" of classification. Ray's zoölogical works are considered by Cuvier as the foundation of modern zoölogy. The chief of his works on botany are "New Method

of Plants" (1682); "Catalogue of the Plants of England" (1670), the basis of all the subsequent floras of Great Britain; and "History of Plants" (1686–1704). His zoölogical works include the "Methodical Synopsis of Animals" (1893). Ray died in Black Notley, Jan. 17, 1705.

RAYAH, in Turkey, a person not a Mohammedan, who pays the capitation tax, called the haratch.

RAYLEIGH, JOHN STRUTT, 3rd BARON, an English scientist; born in Essex, England, Nov. 12, 1842; was graduated, as senior wrangler, at Cambridge, in 1865; succeeded to the title of baron in 1873; in 1884 was president of the British Association; successor to Professor Tyndall as Professor of Natural Philosophy, in the Royal Institution, London, in 1887; Professor of Experimental Physics in the University of Cambridge (1879–1884). Columbia College, New York, bestowed on him the Barnard medal for "meritorious service to science" since he shares with Ramsay the merit of discovering the element ARGON (*q. v.*). He published scientific papers of great value; also "The Theory of Sound" (1877–1878). Awarded Nobel prize for physics (1904); Lord Chancellor of Cambridge, 1908. He died in 1919.

RAYMOND, the name of seven Counts of Toulouse. RAYMOND I. reigned 852–865. RAYMOND VI., son of RAYMOND V., born in 1156, succeeded 1194, and, being a friend of the Albigenses, was twice excommunicated, 1208 and 1211, and despoiled of his estates by Simon de Montfort, 1218; died 1222. RAYMOND VII., son of RAYMOND VI., and last Count of Toulouse, was born 1197, and after struggling with his father for the recovery of his possessions, vanquished Simon de Montfort in 1224. He was so enfeebled by these continual wars, however, that he submitted to a humiliating peace with the Pope and the King of France in 1229. He died 1242, leaving his estates to his only daughter, Jeanne, who had married Alphonse, Count of Poitiers, brother of Louis IX.

RAYMOND, BRADFORD PAUL, an American clergyman; born in Stamford, Conn., April 22, 1846; was educated at Hamline University, Minn., and Lawrence University, Wis., and was graduated at the Theological School of Boston University and ordained in the Methodist Episcopal Church in 1874. He held pastorates in New Bedford, Mass., Providence, R. I., and in Nashua, N. H., and was president of Lawrence University from 1883 to 1889, resigning to become president of Wesleyan University, Middletown, Conn. Died 1916.

RAYMOND, HENRY JARVIS, an American journalist; born in Lima, N. Y., Jan. 24, 1820; was graduated at the University of Vermont in 1840; soon afterward removed to New York; and, while studying law, taught the classics and wrote for the "New Yorker." In 1841 he became managing editor of the New York "Tribune," and afterward leading editor of the New York "Courier and Enquirer." In 1849 he was elected to the State Assembly; was re-elected and made speaker. In 1851, he established the New York "Times." In 1852 he became a delegate to the Baltimore Convention, and in 1856 a leader of the Republican party, and was chosen lieutenant-governor of New York. He was a delegate to the Chicago Convention of 1860; was again elected to the State Legislature, and, in 1864, was chosen as representative from New York to the 39th Congress. He subsequently, in 1866, was the leading spirit of the Wigwam Convention in Philadelphia, the resolutions of which body were from his pen. He died in New York, June 18, 1869.

RAYMOND, JEROME HALL, an American educator; born in Clinton, Ia., March 10, 1869; was graduated at the Northwestern University in 1892; was private secretary to George M. Pullman in 1889–1890; traveled in Europe and Asia; made the circuit of the world in 1890–1892; was professor of history and political science at Lawrence University, Appleton, Wis., in 1893–1894; accepted the chair of sociology and was made secretary of the University Extension Department at the University of Wisconsin in 1895; served as president and professor of economics and sociology at the West Virginia University in 1897–1901; and in the latter year became associate professor of sociology at the University of Chicago.

RAYMOND, JOHN T., right name JOHN O'BRIEN, an American actor; born in Buffalo, N. Y., April 5, 1836. He was educated for a mercantile life. He first appeared on the stage as Lopez in the "Honeymoon," June 27, 1853, in Rochester. The following year he played Timothy Quaint in the "Soldier's Daughter." His greatest characters were those of Asa Trenchard in "Our American Cousin" and Colonel Sellers in the "Gilded Age." He died in Evansville, Ind., April 10, 1887.

RAYNAL, GUILLAUME THOMAS FRANÇOIS, known as the ABBE RAYNAL, a French historian and political writer;

born in St. Geniez, France, April 12, 1713. He acquired a European reputation by his "Philosophical History of the Two Indies." He died in Paris, March 6, 1796.

RAYNOUARD, FRANÇOIS JUSTE MARIE, a French poet and philologist; born in Brignolles, Provence, France, Sept. 18, 1761. He studied at Aix, and became a prosperous advocate, and in 1791 was sent to the Legislative Assembly, where he joined the Girondins. Flung into prison, he was fortunately forgotten till the fall of Robespierre brought release. His poems and tragedies were successful, and in 1807 he was elected to the Academy, of which he became perpetual secretary in 1817. A member of the imperial legislative body from 1806, he continued to produce dramas, but toward the fall of the empire turned his attention to linguistic and particularly Provençal studies. Raynouard died in Passy, near Paris, Oct. 27, 1836.

RAZOR, a keen-edged steel instrument for shaving off the beard or hair. The great center of the razor manufacture is Sheffield, England. The savages of Polynesia still use two pieces of flint of the same size, or pieces of shells or sharks' teeth ground to a fine edge for shaving.

RAZORBACK, one of the largest species of the whale tribe, the *Balænoptera* or *Rorqualus borealis*, the great rorqual (see RORQUAL). Also a name given to a kind of hog, especially in the S. part of the United States.

RAZORBILL, in ornithology, the *Alca torda*, the sole species of the genus *Alca impennis*, the great auk, being extinct. It is about a foot and a half long, plumage of head, neck, and upper surface brilliant black, under surface pure white. They make no nest, but lay a single white or yellowish egg blotched and streaked with dark-brown, on the bare rock. Called also the black-billed auk and murre.

RAZOR FISH, a species of fish with a compressed body, much prized for the table. It is the *Coryphæna novacula*.

RAZOR SHELL, a genus of lamellibranchiate mollusca, forming the type of the family *Solenidæ*. They are common on both sides of the Atlantic; the shells are sub-cylindrical in shape; the hinge-teeth number two on each valve; and the ligament for opening the shells is long and external in position. The mantle is open in front, to give exit to the powerful muscular "foot," used by these mollusks for burrowing swiftly into the sandy coasts which they inhabit. These curious mollusks always live buried in the sand in an upright position, leaving only an opening shaped like a keyhole, which corresponds with the two siphon tubes. They are generally found at a depth of one or two feet, and when they make their burrows, as they are often in the habit of doing, among the rocks, not even the hooked iron can draw them from their retreat. The familiar species are the *Solen siliqua*, *S. ensis*, *S. vagina*, *S. marginatus*, and *S. pellucidus*.

RÉ, ÎLE DE, a small, low-lying island off the coast of the French department of Charente-Inférieure, opposite the city of La Rochelle, from which it is separated by the Pertuis Breton. It is about 18 miles long and 3 broad, measures 28 square miles, and its inhabitants are chiefly engaged in the preparation of salt. Oyster farming has of late become an important branch of industry. Wine is made and exported. Pop. about 15,000.

REA, GEORGE BRONSON, an American electrical engineer; born in Brooklyn, N. Y., Aug. 28, 1869. He practiced his profession in Cuba till the beginning of the revolution; accompanied the insurgent forces of Gomez and Maceo as special correspondent of the "New York Herald"; was present at 80 engagements between Cubans and Spaniards, and was wounded in the action at La Portela. He was present at the bombardment of San Juan, Porto Rico, and in the operation before Santiago. In the early part of the Porto Rico campaign he traveled through the island as an agent in the secret service of the United States Government. He is the author of "Facts and Fancies about Cuba."

REA, SAMUEL, president of the Pennsylvania Railroad; born at Hollidaysburg, Pa., in 1855. At an early age he entered the engineering department of the Pennsylvania railroad. Some years later he directed the work of constructing the tunnels for the Baltimore and Ohio under the city of Baltimore. In 1892 he became assistant to the president of the Pennsylvania, and in 1899 his first assistant. Appointed in that year fourth vice-president of the road he rose continually until in 1913 he was chosen president. Perhaps his greatest engineering exploit was the construction of the tunnels under the Hudson and East rivers.

REACTION, in chemistry, the chemical change or effect produced by bringing at least two elements or compounds together whereby one or more new bodies are formed, which may consist either of

a gas, liquid, or solid, or a mixture of these; as when sulphuric acid is added to chalk, the products of the reaction are sulphate of lime, water, and carbonic acid gas.

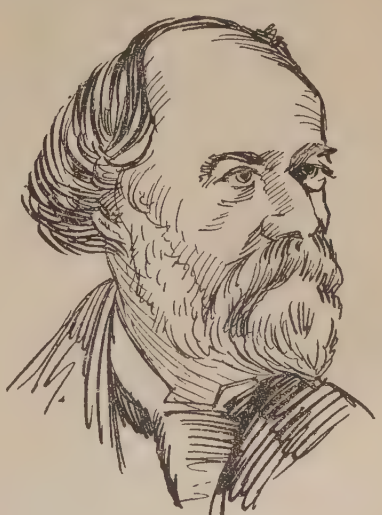
In pathology, action of one kind in antagonism with action of another; action immediately following on action of a directly contrary character; or a state succeeding to a directly contrary one, as the exhaustion consequent on a paroxysm of fever.

In physics, the action of one body on another one acting on it in the opposite direction. Reaction period, in physiology, the time that elapses between the application of a stimulus to the nerves, and the contraction of the muscles, following it in consequence. Roughly speaking, it is for feeling one-seventh, for hearing one-sixth, and for sight one-fifth of a second.

READ, JOHN MEREDITH, an American jurist; born in Philadelphia, Pa., July 21, 1797; was graduated at the University of Pennsylvania in 1812; admitted to the bar in 1818. He held a seat in the Pennsylvania Legislature in 1822–1823; was United States attorney for the Eastern District of Pennsylvania in 1837–1844; and served as chief-justice and attorney-general of Pennsylvania, and solicitor-general of the United States in 1860–1874. He was long a Democrat, and was prominent in the founding of the Free-soil branch of that party. He affiliated with the Republican party when it was formed, and in the presidential campaign of 1856 made an address on the "Power of Congress over Slavery in the Territories," which had much influence throughout the country. In 1858, on the first victory of the Republican party in Pennsylvania, he was elected judge of the Supreme Court, by a majority of 30,000. In 1860 he was mentioned as a candidate for the presidential nomination with Abraham Lincoln for Vice-President, but early in that year Simon Cameron defeated the movement in the Pennsylvania Republican Convention. Several votes, however, were cast for him in the Chicago Convention, though he exerted all his influence in favor of Lincoln. He was the author of "Views on the Suspension of the Habeas Corpus" which became the basis of the law of March 3, 1863, authorizing the President to suspend the *habeas corpus* act. His opinions are found in 41 volumes of reports. The best known of his numerous published addresses include "Plan for the Administration of the Girard Trust" (1833); "The Law of Evidence" (1864); "Jefferson Davis and His Complicity in the Assassination of Abraham Lincoln" (1866); etc. He died in Philadelphia, Pa., Nov. 29, 1874.

READ, OPIE, an American journalist; born in Nashville, Tenn., Dec. 22, 1852. He established and edited for many years the "Arkansaw Traveler." His studies of Arkansas life have been widely read, and include: "Len Gansett" (1888); "My Young Master"; "An Arkansaw Planter"; "Up Terrapin River"; "A Kentucky Colonel"; "On the Suwanee River"; "Miss Polly Lop, and Other Stories"; "The Captain's Romance"; "The Jucklins," a novel; "Bolanyo"; "A Yankee from the West"; "A Tennessee Judge"; "In the Alamo" (1900) "Mystery of Margaret" (1907).

READ, THOMAS BUCHANAN, an American portrait-painter and poet; born in Chester co., Pa., March 12, 1822. His most important works are: "Poems" (1847); "Lays and Ballads" (1848) "The Wagoner of the Alleghanies" (1862); and "Poetical Works" (1867). His best known poems are "Sheridan's Ride" and "Drifting." He also published: "Female Poets of America" (1848); "The Pilgrims of the Great St. Bernard," a romance; "The New Pastoral" (1854), his most ambitious poem; "Sylvia; or, The Lost Shepherd" (1857); and "The Good Samaritans" (1867). He died in New York, May 11, 1872.



CHARLES READE

READE, CHARLES, an English novelist; born in Ipsden House, Oxfordshire, England, June 8, 1814. He was educated at Oxford. In 1843 he was called to the bar as a member of Lincoln's Inn, but

devoted himself to fiction writing. His first works to attract attention were "Peg Woffington" and "Christie Johnstone." Among his subsequent works are: "The Course of True Love"; "White Lies"; "The Cloister and the Hearth"; "Hard Cash"; "Griffith Gaunt"; "Put Yourself in His Place"; "A Terrible Temptation"; "Never Too Late to Mend"; "Foul Play," etc.; and the plays "Gold Masks and Faces" (with Tom Taylor); "A Scuttled Ship" (with Boucicault). His last novel was "A Perilous Secret." He died in London, England, April 11, 1884.

READER, specifically, one whose office it is to read prayers, lessons, lectures, and the like to others; as (a) in the Roman Catholic Church, one of the five inferior orders of the priesthood; (b) in the English Church, a deacon appointed to perform divine service in churches and chapels, of which no one has the cure. (c) A kind of lecturer or professor in universities, etc. (d) In printing offices, a proof-reader is a person who reads and corrects proofs.

READING, a parliamentary and municipal borough of England; capital of the county of Berks; on the Kennet, near its confluence with the Thames; 36 miles W. of London. The town is well built and laid out, and there are an assize hall, the Royal Berkshire hospital, a town hall of recent erection in the Renaissance style, etc. The industrial establishments include a large and celebrated biscuit factory, iron foundries, breweries, corn mills, etc., and there is a considerable agricultural trade. There are interesting remains of a magnificent abbey founded by Henry I., who was buried within its precincts in 1135. Pop. (1917) 82,475.

READING, a city of Massachusetts, in Middlesex co. It is on the Boston and Maine railroad. It is chiefly a residential town and has manufactures of organ pipes, carriages, boots and shoes, rubber, games, etc. It has a public library. Pop. (1910) 5,818; (1920) 7,439.

READING, a city and county-seat of Berks co., Pa.; on the Schuylkill river, the Schuylkill canal, and the Pennsylvania, and the Philadelphia and Reading railroads; 54 miles E. of Harrisburg; 58 miles N. W. of Philadelphia. The city is regularly laid out on a site gradually rising to picturesque hills, which not only afford fine scenic views, but give a copious supply of pure water. Here are waterworks owned by the city and costing $1,500,000, gas and electric lights, inclined gravity and electric railroads, several National and State banks, and Mineral Springs and Penn's Common parks. The charitable institutions include the Reading, St. Joseph's, and the Homeopathic Medical and Surgical Hospitals, several dispensaries, and a Home for Orphans. The city contains over 60 churches, about 50 school buildings, and public school property valued at over $1,000,000. There are upward of 500 manufacturing establishments. Reading is the seat of the Philadelphia and Reading railroad car and machine shops. The chief manufactures are foundry and machine shop products, iron and steel, stoves, woolen hats, brick and tile, cigars and cigarettes, and planing mill products. Reading was settled in 1748, became a borough in 1783, and a city in 1847. Pop. (1910) 96,071; (1920) 107,784.

READING, EARL OF, RUFUS DANIEL ISAACS, Lord Chief Justice of England. Born in London, 1860, the son of a Jewish fruit dealer, he was educated in various universities of London, Brussels, and Hanover. After several years of traveling, he finally studied law. Such was his success in the legal profession that in 1898 he became queen's counsel. In 1904 he was elected as a Liberal to the House of Commons. In 1910 he served as solicitor-general and attorney-general. Although accused of having speculated in stock to the prejudice of his official duties, he was made

EARL OF READING

lord chief-justice in 1913 and elevated to the peerage. In 1915 he came to America to negotiate the Anglo-French loan, which he successfully accomplished. Upon the death of the British ambassador at Washington, Earl Reading was commissioned to take his place, where he remained until 1918, when he returned to England to resume his position as lord chief-justice. He was appointed Viceroy of India in 1920.

REAGENT, in chemistry, any substance employed to bring about a chemical reaction or change in another element, or compound, with the view generally of either detecting its presence or affecting its separation from other substances.

REAL, the old unit of value in Spain. By the monetary law of June, 1864, the silver real was made to weigh 1.298 grammes, .81 fine, and equivalent to 4½ cents. The real has varied in value from 4½ to 10 cents.

REAL, in law, pertaining to things fixed, permanent or immovable. Thus real estate is landed property, including all estates and interest in lands which are held for life or for some greater estate, and whether such lands be of freehold or copyhold tenure. So a real action is an action brought for the specific recovery of lands, tenements, and hereditaments.

REAL COMPOSITION, in law, an agreement made between the owner of land in countries having an endowed church and the parson or vicar with consent of the ordinary, that such lands shall be discharged from payment of tithes, in consequence of other land or recompense given to the parson in lieu and satisfaction thereof.

REALF, RICHARD, an English-American poet; born in Framfield, Sussex, England, June 14, 1834. At 18 he published, under the patronage of several literary people, a collection of poems, "Guesses at the Beautiful." In 1854 he came to the United States, enlisted in the army in 1862, and wrote some of his best lyrics in the field. His most admired poems are: "My Slain," "An Old Man's Idyl," and "Indirection." He died in Oakland, Cal., Oct. 28, 1878.

REALGAR, a monoclinic mineral, occurring but rarely in crystals, but mostly granular to compact-massive. Hardness, 1.5-2; sp. gr., 3.4-3.6; luster, resinous; color and streak, aurora-red to orange-yellow; transparent to translucent; fracture, conchoidal; brittle. Occurs in fine crystals in Hungary and Transylvania, and massive in many localities, frequently associated with orpiment; on exposure to light changes to orpiment. In chemistry, AsS_2. A sulphide of arsenic formed artificially by heating arsenic acid with the proper proportion of sulphur. It is a fusible and volatile substance, having an orange-red color, is used for painting and for the production of white-fire.

REALISM, in philosophy, a doctrine diametrically opposed to Nominalism, as involving the belief that genus and species are real things, existing independently of our conceptions and their expressions, and that these are alike actually the object of our thoughts when we make use of the terms. Again, as opposed to Idealism, the word implies an intuitive cognition of the external object, instead of merely a mediate and representative knowledge of it.

In art and literature the word realism or naturalism is employed to describe a method of representation without idealization, which in our day in France has been raised to a system and claims a monopoly of truth in its artistic treatment of the facts of nature and life. It claims that the enthusiasms and exaggerations of romanticism must give place to a period of reflection and criticism; that we must not select from the facts put before our eyes, but merely register them and the sensations they engender for themselves alone, apart from all considerations of mere beauty, to say nothing of religion or morality; and that the experimental romance must hereafter follow the rigid methods of science, in being based alone on "human documents" supplied from the close observation of the present, or from laborious erudition—the retrospective observation of the past. As a gospel this militant realism is the offspring of the positive philosophy and the physiology and psychology of the age; and in effect, in the hands of its apostles, it has become a new morality which reforms not by precept but example, not by the attraction of the good, but by the repulsion of the evil. The practical result is that for French realists there is in the moral world only the evil, in the visible world only the ugly, and the triumphs of modern fiction are the pitiless impersonality of "Madame Bovary," the cold splendors of "Salammbô," the vulgarities of Zola, the refined sensualism of Bourget and Guy de Maupassant, the pretentious inanities of the Goncourt brothers, and the dreary pessimism of Dostoievsky and Tolstoi. If realism were perfect it would include all reality, order as well as disorder, the

general as well as the particular, the lofty as well as the low. For there are men and women who are neither selfish nor drunken, nor lecherous; your experimental cesspool is not Paris, your Paris is not the universe; your hospital wards may contain cases of all moral maladies, but you forget the moving world of health and life outside its walls; your vaunted collection lacks one specimen, not the rarest, and certainly the most beautiful. For the dream is as true a leaf of life as the sober vision, and idealism is the permanent revenge of man over the inequalities of life—the protest of creative mind against external fatality. Idealistic art seizes life at its richest moments, and presents it preserved forever by its immaterial essence from inconstancy and degradation. This so-called realism is not reality—the steps of true art must ever be elimination and generalization; its postulates, the eternal conventions of form, style, language, and subject, necessary because they are elemental.

REAL PRESENCE, the doctrine of the actual presence of the body and blood of Christ in the eucharist.

REAL SCHOOLS (German, Realschulen), those educational institutions of Germany between the elementary school and the university having for their special object the teaching of science, art, the modern languages, etc.; in contradistinction to the ordinary grammar schools and gymnasiums, in which the classical languages hold a more important place.

REAM, a quantity of paper of any size containing 20 quires or 480 sheets. A common practice is now to count 500 sheets to the ream.

REAPING HOOK, a curved blade of steel set in a short handle, and used for reaping; a sickle.

REAPING MACHINE, a machine for reaping or cutting down grain in the field. There are numerous varieties. Properly speaking, the REAPING HOOK (*q. v.*) (represented 1490 B. C. in a harvest scene on a tomb at Thebes, and still in use) and the scythe are reaping machines; but the term is generally confined to the modern machines, in which operations formerly carried out by the human hand are effected by machinery. The idea of a mechanical reaper was probably suggested by Capel Lloft in 1785, and in 1786, Pott, an Englishman, made the first machine. In 1822 a self-sharpening mowing machine was patented in the United States. Between 1852 and 1874 nearly 3,000 patents for reaping machines were taken out for the United States. Two of the most celebrated are McCormick's, invented about 1831, and improved in 1846, and Wood's reaping and automatic binding machine, first used in 1874. Modern reapers are of three classes, manual delivery, self-raking, and self-binding. A binder largely used, and pushed by 4 to 6 horses, clears a strip 12 to 20 feet wide. There are combined headers and threshers which cut, thresh, and sack grain, doing 100 acres a day.

REASON, in logic, the premise or or premises of an argument, and especially the minor premise. In metaphysics, the power of thinking consecutively; the power of passing in mental review all the facts and principles bearing on a subject, and, after a careful consideration of their bearings, drawing conclusions in many cases conformable with truth. Reason, weighing facts, discovers the law of gravitation, calculates eclipses, weighs the planets, ascertains the constituent elements of the sun, and even of more distant worlds. It can exercise itself on the most abstract and spiritual theories, as well as on those of a simpler character. Reid distinguished between reason and judgment, considering the sphere of the former to be propositions capable of demonstration. Stewart considered the word reason as ambiguous. In common discourse it denotes the power of discriminating truth from falsehood, and right from wrong. To these he adds the power of devising means to accomplish ends; or reason may be limited to the power of distinguishing truth from falsehood; or it may be used of our rational power in general, or of the discursive faculty alone. Brown thinks that there is no faculty of reason which is nothing more than a series of relative suggestions. Immanuel Kant's "Critique of Pure Reason" appeared in 1781. Mill considers reasoning in its extended sense to be synonymous with inference, and divides it into induction, *i. e.*, reasoning from particulars to generals, and ratiocination, reasoning from generals to particulars. Formerly it was believed that of the whole visible creation man alone was capable of reasoning; but Darwin considers that only a few persons now dispute that animals possess some power of reason. Their actions may be due to instinct or to the association of ideas, the last named principle being connected with reason.

In history: On Nov. 10, 1793, the French National Convention ordered the worship of the Goddess of Reason. Madame Maillard, selected as such a

goddess, was drawn on a splendid car to the cathedral of Notre Dame to receive homage from the multitude. For some time afterward that cathedral was designated the Temple of Reason.

REAUMUR, RENÉ ANTOINE FERCHAULT DE, a French physicist and naturalist; born in La Rochelle, France, Feb. 28, 1683. He went to Paris in 1703; in 1708 was chosen a member of the Academy of Sciences; and for nearly 50 years continued to be one of its most active members. As a natural philosopher he is celebrated for the invention of an improved thermometer, which he made known in 1873, but his greatest work is "Natural History of Insects" (6 vols.). He died in Maine, France, Oct. 18, 1757.

REAUMURIACEÆ, in botany, reaumuriads; an order of hypogynous exogens, alliance Guttiferales; small shrubs, with fleshy scale-like exstipulate leaves, covered with resinous sunk glands. From the coasts of the Mediterranean and the salt plains of temperate Asia. Known genera three, species four.

REAUMUR'S SCALE, a scale for a thermometer, in which the two fixed points being as in the Centigrade, the division is into 80 instead of 100 parts. It is still occasionally used.

REBEC, or REBECK, the English name of a three-stringed musical instrument played with a bow. It was of Arabian or Turkish origin, and in its earliest form it probably had a long neck and small round body, made of cocoanut shell, or some such material, over which parchment was stretched to form the sound board. After its introduction into Europe, the third string was added. The rebec gradually assumed the form of a viol, of which it was the precursor.

REBEKAH, DAUGHTERS OF, a degree in the ritual of Odd Fellowship, to which women are admitted.

REBELLION, the taking up of arms, whether by natural subjects or others, residing in the country, against a settled government. By international law rebellion is considered a crime, and all persons voluntarily abetting it are criminals, whether subjects or foreigners. When a rebellion has attained such dimensions and organization as to make of the rebel party a state *de facto*, and its acts reach the dimensions of war *de facto*, it is now the custom of the state to yield to the rebels such belligerent privileges as policy and humanity require, and to treat captives as prisoners of war, etc.

REBUS ("by things"), a word, name, or phrase represented by the figure of an object which resembles in sound the words, or syllables of the words, indicated; an enigmatical representation of words by the use of figures or pictures; thus, a "bolt" and a "tun" represent "Bolton." In heraldry, a device intended to represent a proper name by a picture; a bearing or bearings on a coat of arms, containing an allusion to the name of the owner; as in the coat of the family of Arches, which consists of three arches.

RECALL, a method of compelling an elective official to resign or submit himself to a new election before his regular term of office expires. It was first adopted in Los Angeles, Cal., in 1904. Under its provisions a certain percentage of the voters who are dissatisfied with the official circulate a petition for his recall. The percentage of the electorate who must sign the petition in order to make it effective varies in different States, the usual percentage being 25 per cent., as the law is in Oregon. When the required proportion has signed the official must either resign or submit to a new election. It has been adopted by more than two hundred cities and by thirteen States, viz.: Ore., Cal., Wash., Nev., Mich., Ariz., Colo., Idaho, Kans., La., Wyo., N. D., Wis.

When Arizona applied for admission to the Union, President Taft refused to sign the bill admitting her to statehood until the recall of judges was eliminated from the State Constitution. Roosevelt advocated in the primary campaign of 1912 the recall of judicial decisions by which the decision of the courts on questions involving the powers of the Legislature under the Constitution should be subject to a popular referendum. The scheme was never adopted by any State and soon became a dead issue politically. The recall of judges likewise has not been generally adopted and American public opinion has rather tended to agree with President Taft that the practice is not in consonance with American institutions.

RÉCAMIER, MADAME (JEANNE FRANÇOISE JULIE ADÉLAIDE BERNARD), a famous Frenchwoman; born in Lyons, France, Dec. 4, 1777. At 15 she was married to M. Jacques Récamier, a rich banker about thrice her own age. Her salon was soon filled with the brightest wits of the literary and political circles of the day. For Madame de Staël she had a warm affection that survived the exile required by the jealousy of Napoleon. Soon after this her husband was completely ruined, and Madame Récamier visited Madame de Staël at

Coppet in Switzerland (1806). Here she met Prince August of Prussia, who alone of all her innumerable admirers is supposed to have touched her heart. The most distinguished friend of her later years was M. de Châteaubriand. In 1846 he became a widower, and he then wished to marry Madame Récamier, whose husband had been dead since 1830, but the lady declined. She died May 11, 1849. Her "Recollections and Correspondence" were edited by her niece, Madame Lenormant in 1859.

RECANATI, a town of Italy, 15 miles S. of Ancona; has a Gothic cathedral with a monument to Pope Gregory XII. Here Leopardi was born. Porto Recanati is 6 miles N. E. on the Adriatic coast.

RECAPTION, in law, recaption or reprisal is another species of remedy by the mere act of the party injured. This happens when anyone has deprived another of his property in goods or chattels personal, or wrongfully detains one's wife, child, or servant; in which case the owner of the goods, and the husband, parent, or master, may lawfully claim and retake them, wherever he happens to find them; so it be not in a riotous manner, or attended with a breach of the peace.

RECEIPT, a written document, declaring that certain goods or a sum of money have been received. A receipt, though evidence of payment, is not absolute proof, and this evidence may be rebutted by proving that it was given under misapprehension.

RECEIVER, a person specially appointed by a court of justice to receive the rents and profits of land, or the produce of other property, which is in dispute in a cause in that court. The name is also given to a person appointed in suits concerning the estates of infants, or against executors, or between partners in business, or insolvents, for the purpose of winding up the concern.

RECEIVER OF STOLEN GOODS, one who takes stolen goods from a thief, knowing them to be stolen, and incurs the guilt of partaking in the crime. If the theft amounts to felony the punishment is penal servitude of from 3 to 14 years, or imprisonment for two years; if a misdemeanor, penal servitude from three to seven years, or imprisonment for not above two years. In the United States the penalty is fixed by statutes in the several States.

RECENT, in geology, a term applied to a division of the post-Tertiary in which all the mammalia, as well as all the shells, are identical with living species. In certain places it is difficult to draw a distinction between the Recent and the Pleistocene deposits. Alluvium brought down by rivers, modern peat, the Clyde marine strata with canoes, the kitchen middens of Denmark, and the lake dwellings of Switzerland belong to the Recent period.

RECEPTACLE, in botany: (1) Any part which supports another part. The receptacle of a flower is the top of the peduncle on which the flowers are inserted. It may be a flattened area, or a vanishing point, or may be greatly dilated. The receptable of a fruit is its torus. The receptacle of an ovule is the placenta. The receptacle of the sporangia in a fern is the vein passing through their axis. (2) A cavity for the reception of any substance. The receptacle of oil is one of the cysts which contain it, as, for instance, those on the rind of the orange.

RECHABITE, a member of a section of the Kenites, called in Hebrew *rechabim*, from Rechab (= the horseman; *rachab* = to ride), the father of Jonadab, who enjoined his descendants to abstain from wine, from building houses, sowing seed, and planting vineyards, and commanded them to dwell in tents (Jer. xxxv: 2-19). Wolff mentions an interview he had with a nomadic Jew near Senaa, who claimed to be a descendant of Jonadab, stating that his tribe were 60,000 in number, and adhered to their ancient laws, and that they were a living fulfillment of the prophecy of Jer. xxxv: 19. Hence, one who abstains from alcoholic beverages; a teetotaler. Also a member of the Independent Order of Rechabites, a friendly society founded on temperance principles, "so that abstainers could be united together, and have the privileges of a benefit society as well." The first meeting was held at the Temperance Hotel, Bolton street, Salford, Lancaster, England, Aug. 25, 1835. The Rechabite pledge is extremely stringent and far-reaching, but the order is steadily increasing in Great Britain, and has been introduced into the United States, Canada and Australia. Their lodges are called "tents" in allusion to Jer. xxxv: 7. The Independent Order of Rechabite was established in the United States in 1842. Its headquarters are at Washington, D. C. The total number of members in the United States on Jan. 1, 1921, was 538,078.

RECIPROCAL, in grammar, reflexive. Applied to verbs which have as an object a pronoun standing for the subject; as, "Bethink yourself." It is also applied

to pronouns of this class. As a noun, that which is reciprocal to another thing. Specifically, in mathematics, the quotient resulting from the division of unity by the quantity; thus the reciprocal of a is $\frac{1}{a}$, of 2 is ½, of $a+b$ is $\frac{1}{a+b}$, etc. The product of a quantity, and its reciprocal, is always equal to 1. The reciprocal of a vulgar fraction is the denominator divided by the numerator; thus the reciprocal of ½ is 2, of ⅔ is 3/2, etc.

RECIPROCATING ENGINE, the common form of engine, in which the piston and piston-rod move backward and forward in a straight line, absolutely or relatively to the cylinder, as in oscillating-cylinder engines. The term is used in contradistinction to rotary engines.

RECIPROCITY, a policy under which there exist two sets of tariff duties; one to be put in force under ordinary circumstances; the other a much lower one to be established in case another country reduces its tariff schedules to a corresponding scale. In the case of the United States reciprocity has been greatly talked of as existing between that nation and Canada. In 1854 a reciprocity treaty was negotiated between the two countries which provided for mutual free trade between the United States and Canada. While it was popular at first in stimulating trade the business depression in the United States in 1857 greatly influenced that nation to repeal the act in 1865.

The Republican party a few years later, in order to please the agricultural and exporting classes who were in general opposed to the high tariff, championed the principle of reciprocity. In 1875 a reciprocity treaty was negotiated and signed between Hawaii and the United States, but it was not until the McKinley Administration that such treaties were made with any important nations. During that administration reciprocity was established with France, Portugal, Germany, and Italy. Treaties were negotiated with other countries which the Senate refused to ratify. President McKinley in his last public address, the Buffalo Exposition speech, strongly advocated reciprocity. In 1903 a reciprocity treaty with Cuba was negotiated and ratified by the Senate.

In 1911 President Taft negotiated a reciprocity treaty with Canada and in spite of the opposition of many of the Western members of his party he succeeded in securing its passage by Congress, only to have it rejected by Canada. The Democrats, believing as they do in low tariff duties, have never espoused reciprocity, holding that the reciprocal action of another country is immaterial.

RECITATIVE, in music, a species of musical declamation, not necessarily in rhythmical form, but so arranged or designed as to assimilate musical sounds as nearly as possible to ordinary speech. It is used in operas, oratorios, etc., to relate a story, to express some action or passion, or to reveal a secret or design, and is of two kinds, unaccompanied and accompanied, the latter being the more common in modern music. Also, a piece of music intended to be sung in recitative.

RECLUS, JEAN JACQUES ELISÉE, a French geographer; born in Sainte-Foix la Grande, France, March 15, 1830. In consequence of his extreme democratic views he left France after the coup d'état of 1851, and spent the next seven years in England, Ireland, North and Central America, and Colombia. He returned to Paris in 1858, and published "Journey to the Sierra Nevada of Sainte Marthe" (1861), and an introduction to the "Dictionary of the Communes of France" (1864). For being concerned in the Communistic outbreak of 1871 he was banished from France, but returned under an amnesty in 1879. While living in exile in Switzerland he began his great masterpiece, "New General Geography" (14 vols. 1876–1889). Reclus has also written another great work, a physical geography entitled "The Earth" (Eng. trans. 1871 and 1887); "History of a Brook" (1866); besides "Terrestrial Phenomena" (1873) and "History of a Mountain" (1880). Died 1905.

RECOGNIZANCE, or RECOGNISANCE, in law an obligation of record, which a man enters into before some court of record or magistrate duly authorized, with condition to do some particular act; as, to keep the peace, to pay a debt, or the like. Also the verdict of a jury impaneled upon assize.

RECONNAISSANCE, the act or process of reconnoitering; a preliminary survey or examination; specifically applied to: (1) The examination of a territory, district, etc., or of an enemy's position, for the purpose of directing military operations. (2) The examination or survey of a region in reference to its general geological character. (3) A preliminary examination of a county or district in reference to its general natural character, preparatory to a more

particular survey for the purposes of the construction of public works, as of a road, canal, railway, etc.

RECONSTRUCTION, in United States history, a making-over of the political fabric of the States that composed the Southern Confederacy. At the close of the Civil War, these States were practically without governments, those which they had established after their withdrawal from the Union having been overthrown. They had been declared insurgents and therefore their relation to the United States Government was that of a conquered territory.

The treatment of these States became a problem. Plans for the solution were submitted which may be classified as follows: (1) The theory that as soon as the bare number of Union men who had always been in these States, had established a loyal government, the States would then be regularly reconstituted. (2) The theory in President Lincoln's proclamation of Dec. 8, 1863, stipulating that if after having taken a prescribed oath of allegiance, one-tenth of the number of voters of 1860 should establish a loyal government it should be recognized, this stipulation applying to all such governments; the theory including a provision of amnesty on certain conditions for all, with the exception of a specified portion of those in rebellion. (3) Sumner's theory that a State renounces its State rights through the act of withdrawal, and in doing so abolishes a right to slavery which is an institution based merely on State authority; that Congress should institute measures to establish this conclusion as a fact, and also to protect all the inhabitants of the State, and therein to set up a republican form of government. (4) Thaddeus Stevens' theory that insuperable resistance to the Constitution suspends its operations and that it then becomes incumbent on the National government to decide when it is to be resumed. (5) The Davis-Wade theory introduced by Henry Winter Davis and Benjamin F. Wade, from the "Committee on Rebellious States." This theory made provisions for the appointment of provisional governors, the emolument of citizens ready and willing to take the oath of allegiance, the approval and adoption of a constitution, and recognition of the State by admission. (6) The congressional theory which was really carried into effect.

Measures radically discriminating against the negroes had been adopted by the Legislatures reconstructed under the proclamation of Dec. 8, 1863. This had excited and united Republican feeling in the North against the President's policy. Meantime President Lincoln had been assassinated and Vice-President Johnson had taken the presidential chair. When Congress assembled, in December, 1865, Republican opposition was manifest in an enactment that no State should be represented in either House till Congress had declared its right to representation. A bill was passed proposing the Fourteenth Amendment to the National Constitution, and declaring the right of representation to any States ratifying. The Civil-Rights Bill followed, and the bill enlarging the provisions of the freedman's bureau, were passed over the President's veto. According to Congress, the Constitution of the United States retained the authority vested in it over States which through their act of withdrawal, had suspended their State governments, since those States were not viewed as "destroyed," but as being in a position for restoration to "their former political relations" in the Union, by consent of the law-making power of the United States.

The Republicans were divided in their policy, one faction sustaining the President in his opinions, the other faction being resolute in the feeling that adherence to his opinions was treason to the party. Some indiscreet speeches made by President Johnson during a trip through some Northern and Western States accentuated Republican opposition to his policy. Congress then passed a series of laws, some of them over the President's veto. Among these were the Tenure of Office Act, establishment of universal suffrage in the territories, admission of Nebraska into the Union, and making General Grant irremovable as head of the army. Meantime, but one State, Tennessee, had been admitted, July 24, 1866, none of the others adopted the Fourteenth Amendment. In view of the situation, Congress divided the South into five military districts. A military governor was appointed for each district, and he was empowered to protect life and property through local courts or military commissions. Each governor was to supervise the election of delegates to a constitutional convention to which all but certain disqualified classes were to be admitted, such delegates to be elected by those eligible to vote. It was provided that such constitutions should be ratified by a popular vote, and then placed before Congress, the next measure to be a ratification of the Fourteenth Amendment by the new Legislature so including the amendment in the State constitution, which act should entitle the State to representation in Con-

gress. The bill with such provisions was passed over the President's veto, March 2, 1867. The provisions of the bill were carried out, and the constitutions which were adopted abolished slavery, renounced the right of secession, and agreed to pass no laws limiting the liberty of any class of citizens and repudiated the debts incurred during the Civil War. Governors and legislators were elected under these constitutions. Arkansas was admitted June 22, 1868; North Carolina, South Carolina, Georgia, Florida, Alabama, and Louisiana, June 25, 1868; Virginia, Jan. 26, 1870; Mississippi, Feb. 23, 1870; Texas, March 30, 1870. Congress did not complete the readmission of Georgia till July 15, 1870, that State having failed in its compliance with the general policy. The four States last named were compelled to ratify the Fifteenth Amendment, also before their admission, as a penalty for delay in complying with the plan of Congress. The Union of the United States was thus restored, and the Supreme Court of the United States in the case of Texas *vs.* White declared the action of Congress constitutional.

Reconstruction measures instituted after the World War are treated under the name of the countries involved.

RECORD, the list of known facts in a person's life, especially in that of a public man; personal history. Also something set down in writing for the purpose of preserving the memory of a fact or event; specifically a register; an authentic or official copy of a document, or account of any facts, acts, or proceedings, whether public or private, entered in a book for preservation; also, the book containing such entries. In law, authentic or official testimonies in writing, contained in rolls of parchment, and preserved in a court of record. Congressional Record, a pamphlet published daily during sessions of Congress and containing a record of the proceedings of that body. Conveyances by record, in law, conveyance evidenced by the authority of a court of record, as a conveyance by private act of Legislature or a government grant. Court of record, in law, a court of record is defined to be that where the acts and judicial proceedings are enrolled or recorded; which rolls are called the records of the court, and are of such high authority that their truth is not to be called in question. Nothing can be averred against the record nor shall any plea, or even proof, be admitted to the contrary. And if the existence of a record be denied, it shall be tried by nothing but itself; that is, upon bare inspection whether there be any such record or no; else there will be no end of disputes. Debt on record, in law, a debt which appears to be due by the evidence of a court of record. Geological record, the record of the history of the globe, as written upon the rocks especially by means of fossils. It is imperfect; many gaps existing, some of which may never be filled up. To beat, break, or cut the record, in sporting concerns, to do a distance in less time than has yet been officially recorded, to excel any previous performance. Trial by record, in law, a trial which is heard when a matter of record is pleaded.

RECORDER, a musical instrument, formerly popular in Great Britain, resembling a flageolet in shape. The instrument was wider in the lower half than in the upper; its tones were soft and pleasing, and an octave higher than the flute.

RECORDER, in England, the chief judicial officer of a borough or city, exercising within it, in criminal matters, the jurisdiction of a court of record, whence his title is derived. The appointment of recorders is vested in the crown, and the selection is confined to barristers of five years' standing. The same name is given to similar legal functionaries elsewhere, as in some American cities.

RECTANGLE, in geometry, a parallelogram or quadrilateral figure whose angles are all right angles. An equilateral rectangle is a square. A rectangle is said to be contained by any two of the sides about one of its angles; thus, if A B and B C represent two adjacent sides, the rectangle is said to be contained by A B and B C, or, as it is sometimes expressed, it is the rectangle under A B and B C. The area of a rectangle is equal to the product of its base and altitude. Rectangles having equal bases are to each other as their altitudes; rectangles having equal altitudes are to each other as their bases.

RECTIFY, to refine or purify spirit or common alcohol by a process of distillation, with the aid of certain herbs, essences, and other flavoring ingredients. More strictly, to separate the lighter portions of any liquid, and render pure and homogeneous any alcohol, ether, or volatile oil, by repeated distillation. In geometry, to construct a straight line equal in length to a definite portion of. (Said of a curve.) To rectify the globe in astronomy or geometry, to bring the sun's place in the ecliptic on the globe to the brass meridian, or to adjust it in order to prepare it for the solution of a proposed problem.

RECTOR, in the Established Church of England a clergyman who has charge of a parish, and has the parsonage and tithes; the clergyman of a parish where the tithes are not impropriate, as distinguished from a vicar. In the Roman Catholic Church, the head of a religious house; among the Jesuits, the head of a house that is a seminary or college. Also the principal of a university in France and Scotland, also the heads of Exeter and Lincoln Colleges, Oxford. In Scotland the headmaster of an academy, or important public school.

RECTUM, in anatomy, the lowest portion of the large intestine extending from the sigmoid flexure of the colon to the anus.

RECUSANT, one who is obstinate in refusing; one who will not conform to general opinion or practice. In English history, one who refused to acknowledge the sovereign's supremacy, or who refused or neglected to attend divine service in the Established Church, and to worship according to its forms and rites. It differed from a non-conformist in that it included popish recusants.

RED, a color resembling that of arterial blood; the color of that part of the solar spectrum which is farthest from violet; one of the three primary colors. Also a pigment. The most useful red pigments are carmine, vermilion (sulphuret of mercury), chrome-red, scarlet-lake (biniodide of mercury), madder-lake, light red, burnt sienna; these are yellow reds. Venetian red, Indian red (carbonate of oxide of iron), and crimson-lake are blue reds.

RED ADMIRAL BUTTERFLY (*Vanessa Atalanta*), the popular name of a common butterfly. The anterior wings are marked by a broad red band, outside of which are six white markings, while a bluish streak follows the wing margin. The posterior wings are bordered with red, dotted with black spots, and have two bluish markings on the inner angles.

REDAN, in fortifications, a work having two faces forming a salient angle in the direction from which an attack may be expected. It is open at the gorge. A double redan has a re-entering angle for mutual defense. The redan is the simplest field work, and is used for defending the avenues of approach to a village, bridge, or defile. In front of another field work, it is called a fléche. When flanks are added to the faces, the work becomes a detached bastion or lunette.

REDAN, THE, one of the strongest Russian fortifications on the S. side of Sebastopol. It was unsuccessfully assaulted by the English on June 5 and Sept. 8, 1855. The retirement of the Russians to the N. side left, on the latter date, the place in the hands of the allies.

RED BANK, a town in Monmouth co., N. J., on the Shrewsbury river, and on the Pennsylvania and the Central of New Jersey railroads; 26 miles S. of New York. The town has regular steamboat connection with New York. Here are a public library, high school, National banks, and weekly newspapers. There is a considerable trade in fish and oysters. The town has manufactories of gold-leaf, carriages, and canned goods. Pop. (1910) 7,398; (1920) 9,251.

RED BAT, in zoölogy, *Atalapha novæboracensis*, from the temperate parts of North America. Length about two inches; fur long and silky, generally light russet, tinged with yellow, darker and richer on the back.

RED-BILLED CURLEW, in ornithology, *Ibidorhynchus struthersi*, found only in the Himalaya Mountains and the hills of central Asia.

REDBIRD, the popular name of several birds in the United States, as the *Tanagra æstiva* or summer red bird, the *Tanagra rubra*, and the Baltimore oriole or hang nest.

RED BOOK, an English government book containing the names of all persons in the service of the state.

RED BROCKET, in zoölogy, the *Cervus rufus* or *Subulo rufus*. It is about 30 inches high, reddish-brown, with simple, unbranched antlers; females hornless. Habitat, the low, moist woods of South America.

RED CEDAR, a species of juniper (*Juniperus virginiana*) found in North America and the West Indies; the heart wood is of a bright red, smooth, and moderately soft, and is in much request for the outsides of black lead pencils.

RED CORAL (*Corallium rubrum*), an important genus of sclerobasic corals belonging to the order *Alcyonaria*. Red coral is highly valued for the manufacture of jewelry, and is obtained from the coasts of Sicily, Italy, and other parts of the Mediterranean.

RED CROSS, THE, is a society organized under governmental authority to furnish volunteer relief to the sick and wounded of armies in time of war and to all who may need relief in time of great national calamities; and to prevent other

suffering in time of peace. Thus its emblem has come to stand for the world ideal of mercy. It knows neither race, color nor creed.

Previous to the American Civil War there had been no organization which occupied the position now held by the Red Cross, although there had been heroic and organized effort made to care for the sick and wounded in most of the great wars in history by such nursing orders as the Knights Hospitaller of St. John of Jerusalem, of Rhodes, and Malta, and the sisters of St. Vincent de Paul.

In 1854 when the allies were fighting the Russians in the Crimea, there came a call from the British War Department for "devoted women willing to go forth and minister to the suffering soldiers in the hospitals of Scutari." Florence Nightingale and thirty-eight nurses answered the appeal. This band may be called the seed from which sprang the Red Cross, for out of it developed the movement for a universal relief organization.

Florence Nightingale's work in the Crimea vitalized the desire of Henri Dunant, a Swiss physician, to alleviate the sufferings in the French-Sardinian war against Austria. He organized the workers at Solferino, Italy, who cared for suffering friend and foe alike. Out of this grew the movement for a permanent society of volunteers, which, in time of war, would render succor to the wounded without distinction of nationality; and it was largely through the efforts of Dunant that the movement grew and received the support of the crowned heads of the world.

For many years there had existed in Geneva a Society of Public Utility, whose efforts were devoted to the furtherance of philanthropic and humane work. Aroused by Dunant's plea, this society appointed a special committee, which sent out an invitation for a conference to be held at Geneva in October, 1863, to consider the question of volunteer aid for the medical service of armies in time of war and also the neutralization of its personnel. At this first conference fourteen countries were represented. The results were meager, but encouraging. They are expressed in the following resolution:

"That in each country adhering to the proposed agreement a committee should be formed to co-operate in time of war with the military medical service, each committee being organized as its members deemed expedient; in time of peace a trained personnel should be organized and supplies collected; the aid of societies of neutral nations might be invited; the volunteer societies irrespective of the country to which they belonged should wear a distinctive badge—a red cross on a white ground; and that the personnel should be neutralized."

Because of the success of this conference, the Swiss Government, in 1864, addressed an invitation to twenty-five sovereign states to send representatives to a diplomatic convention to be held in Geneva in August of that year. At this convention a treaty was adopted which is generally called the Geneva Treaty, but sometimes the Red Cross Treaty. It provides for protection for hospital formations and their personnel in time of war. Out of compliment to Switzerland, the Swiss flag with its colors reversed—a red cross on a white ground—was adopted as the world-wide insignia of humanity and neutrality.

This treaty, revised at a convention held in Geneva in 1906, includes under its protection the Red Cross, or volunteer aid societies which have received official sanction from their respective governments. The Treaty of The Hague extends to naval warfare the treaty of Geneva.

During the American Civil War there was created by the United States Government an organization known as the Sanitary Commission, which, though unpopular with government officials at first, developed rapidly into one of the most popular commissions working in conjunction with the military organizations. Once the need of a service which should not only care for the sick and wounded, but should likewise preserve the morale of the men, became evident, the success of this commission was assured. By 1863 its value was so well established that Gen. U. S. Grant, commanding the Federal Army, ordered that it should be given every opportunity for increasing its effectiveness.

It is agreed by all historians that the Treaty of Geneva in 1864 was very largely the outcome of the practical labors of this Sanitary Commission. "Herald of the spirit of the Red Cross," writes Miss Mabel T. Boardman in her book on the Red Cross, "the Sanitary Commission recognized neither friend nor foe in the care of wounded men."

The Treaty of Geneva is not mandatory upon any country unless the enemy's government is also one of the signatory powers.

The United States did not sign the Treaty of Geneva until 1882, although a Red Cross organization was incorporated in the District of Columbia in July 1881, of which Miss Clara Barton was named president, under the name American National Association of the Red Cross. In 1900 it was re-incorporated

by act of Congress, the charter requiring that a financial statement should be made annually. Again in 1905 this association was dissolved and a new corporation created by act of Congress, the charter of which provides that its accounts shall be audited by the War Department and that an annual report shall be submitted to Congress.

In each country the Red Cross is organized to suit local conditions and is governed by a Central Committee. To the American Red Cross Central Committee the President of the United States appoints the chairman and representatives of the Departments of State, Treasury, War, Justice and Navy. The incorporators—a self-perpetuating board—elect six, and the delegates of boards, chapters and affiliated bodies elect six. This committee of eighteen selects an executive committee of seven from among its own members.

Not infrequently the expression "the International Red Cross" is used, as if this were the name of some definite organization. There is no such international order of the Red Cross except the International Committee at Geneva. The Red Cross of each country is absolutely independent of all others except in so far as it has become a member of the League of Red Cross Societies. What is required of each society is official authorization by its own government to enable it to obtain the recognition of the governments of other powers. The International Committee of the Red Cross consists of nine residents of Switzerland.

Every five years, up to 1912, there was held an International Red Cross conference, at which have been represented not only the Red Cross societies, but the governments and the knightly orders of St. John of Jerusalem and of Malta. The conference of 1902 was in Petrograd, of 1907 in London and in 1912 in Washington.

Immediately after the organization of the American Red Cross in 1881 it was called upon to render relief service in fires and floods which swept over numerous sections of the United States. Although only recently organized it did heroic work and started that form of relief now designated by congressional charter as one of its functions.

The Russian Red Cross up to the time, at least, when the government fell into the hands of the Bolshevists, was an extensive organization. The majority of Red Cross organizations are supported entirely by voluntary gifts, but the Russian Red Cross has also been aided by special taxes collected on theater tickets, railroad fares and passport fees. Russia, through its Red Cross, has generously extended aid to other countries in war. It is doubtful if in any other country the women of the royal household and the nobility have taken a more active part.

The Japanese Red Cross has shown a rapid and wonderful development. The famous Iyeyasu said to his soldiers: "The object of battle is to disable the enemy by shooting him down, but not to torment him needlessly and inhumanly." It is said that this spirit of the old sovereign of Japan accounts for the wonderful growth of the Red Cross spirit in the Mikado's realm. Japan did not become a signatory of the Treaty of Geneva until 1884, when the association became the Red Cross of Japan under the patronage of the emperor and empress. The governor of every district in Japan has accepted the presidency of the local branch. In its work of preparedness the Japanese Red Cross is not surpassed by that of any other country.

The great struggle which overwhelmed Europe in 1914 put upon the Red Cross a burden almost beyond comprehension, and especially upon the French Red Cross. The French society consists of three independent branches under one central committee. The war came so suddenly that it found these branches overlapping and confusion ensued for a time. Co-ordination was soon worked out and Red Cross work was successfully prosecuted.

Great Britain had no regular Red Cross organization until 1897. It had, however, an organization that partook of the name, which was formed in 1870, but it carried no centralized power. Confusion, overlapping, delay and waste of material were the inevitable results for a time but organization finally was perfected.

The German Red Cross is said to have been the most constantly active of all nations. Not only has it served in time of disaster, but it has undertaken a constant daily service in health and sanitary matters not only about military camps, but among the civilian population. The German First Aid organization is considered a model.

Soon after the United States entered the World War there began an enormous expansion of membership and activities of the American Red Cross. With steadily increasing facilities the organization extended its work in the countries of the Allies, co-operating fully with the respective national Red Cross societies, and relieving them more and more of the burden they had carried since the beginning of the conflict. This was an entirely separate function from that of

providing for the welfare of the American Expeditionary Forces.

The American Red Cross had on May 1, 1917, an enrollment of 486,000 members in 562 chapters, and on Feb. 28, 1919, there were 20,000,000 adult members in 3,724 chapters with 17,186 branches, and 11,000,000 junior members among school children. During these twenty months the total revenues were roundly $400,000,000, with expenditure of $273,000,000. Of this, $164,000,000 went for relief abroad, and $109,000,000 for relief in the United States. The remaining $127,000,000 was used in both foreign and domestic relief during 1919.

Wartime domestic activities included the recruiting of 23,822 nurses, most of whom were inducted into the Army Nurse Corps; the formation of fifty-four base hospitals and forty-seven ambulance companies which served overseas; home service to soldiers and their dependents; operation of cantonment canteens; maintenance of a large auxiliary motor corps. Women and children in chapters produced hospital supplies and garments valued at $100,000,000, more than 100,000 tons of which were sent abroad.

Working on a vast scale in Belgium, England, France, Italy, Palestine, Rumania, Russia, Serbia, Siberia, Switzerland, Syria and Turkey, the American organization operated military hospitals, canteens, convalescent homes; re-educated war cripples, supervised plastic curative surgery, supplied and fitted artificial limbs, gave relief to allied prisoners of war; fed, clothed and provided medical care for refugees, a great number of whom it repatriated; rebuilt destroyed towns; conducted civilian hospitals, dispensaries and clinics, and carried on widespread measures against tuberculosis, typhus and other diseases.

With the dissolution of the War Council, Feb. 28, 1919, the American Red Cross launched a peacetime program under the pre-war form of organization. This program includes continuation of aid to disabled and needy veterans of the World War, service for the peace time army and navy, development of stouter national resistance to disease through health centers, increase of the nation's nursing resources and co-operation with official health agencies, continued preparedness for relief in disasters, home service and community work, and completion of relief work among disease ridden and war exhausted peoples abroad.

As an outgrowth of co-operative work during the war, and as a necessity to meet worldwide reconstruction problems, there was formed by the national organizations of the United States, Great Britain, France, Italy and Japan, at Cannes, France, in May, 1919, the League of Red Cross Societies, whose peacetime duties would be equivalent to the wartime duties of the International Committee.

The League's charter states that it will "encourage and promote in every country in the world the establishment and development of a duly authorized voluntary national Red Cross organization, having as purposes the improving of health, the prevention of disease and the mitigation of suffering, and to secure the co-operation of such organizations for these purposes; will promote the welfare of mankind by furnishing a medium for bringing within reach of all peoples the benefits to be derived from present known facts and new contributions to science and medical knowledge and their application; and will furnish a medium for co-ordinating relief work in case of great national or international calamities." Besides the founder members the League included, Oct. 1, 1920, the Red Cross organizations of Argentina, Australia, Belgium, Brazil, Canada, China, Cuba, Denmark, Greece, Holland, India, New Zealand, Norway, Peru, Poland, Portugal, Roumania, Serbia, South Africa, Spain, Sweden, Switzerland and Venezuela. Control of the League reposes in a General Council composed of representatives of all member societies, a governing board of fifteen members and two ex-officio members.

The enrollment in the American Red Cross, Oct. 1, 1920, was 10,000,000 adult members and 14,000,000 juniors. Argentine had 4,000; Brazil, 6,600; China, 26,000; Denmark, 25,000; France, 250,000; Holland, 18,000; Italy, 300,000; Japan, 1,900,000; New Zealand, 10,000; Norway, 9,000; Poland, 30,000; Portugal, 5,500; Roumania, 14,000; Serbia, 2,850; Spain, 63,000; Sweden, 65,000; Switzerland, 42,500; Uruguay, 300. Figures for England, Canada and Australia, which have important organizations, were not available on that date.

RED CURRANT (*Ribes rubrum*), a deciduous shrub much cultivated for its fruit, indigenous in the N. portions of Europe and America. The juice of the fruit is used for making jelly, and a well-known fermented liquor called currant wine.

RED DEER. See STAG.

REDEMPTIONISTS, one of the names of an order of monks devoted to the redemption of Christian captives from slavery. They are more frequently called Trinitarians.

REDEMPTORISTS, members of the Congregation of the Most Holy Redeemer, founded by St. Alphonsus Maria de Liguori (1696–1787), at Scala, in 1732. The members take the three simple, but perpetual, vows, and a fourth, of perseverance in the Institute till death. Their principal object is the preaching of missions and retreats to all classes of Roman Catholics, giving preference to the ignorant and neglected. Their dress is a black serge cossack, with cloth girdle and rosary beads.

REDESDALE, the valley of the river Reed in Northumberland, England; extending almost from the Scottish border in a S. E. direction for over 16 miles, till it opens up into the valley of the Tyne, the river joining the North Tyne at Reedsmouth. The river springs out of the Cheviot Hills, which lie athwart the head of the dale, and down its course from Carter Toll on the border lay one of the chief roads into England. Watling Street itself traverses its middle and upper part. Near the S. end of Redesdale is the famous field of Otterburn. Redesdale gave from 1877 the title of earl to John Thomas Freeman Mitford (1805–1886), who was son of the ex-speaker, John Mitford (died 1830), first Baron Redesdale.

RED-EYE, or **RUDD**, a fish belonging to the same genus as roach, chub, and minnow. It is common in lakes, slow rivers, and fens, in many parts of Europe and in England.

REDFIELD, ISAAC FLETCHER, an American jurist; born in Wethersfield, Vt., April 10, 1804; was graduated at Dartmouth College in 1825; and practiced his profession in Windsor and Derby, Vt. In 1835, he was made judge of the Supreme Court of Vermont, and in 1852 became chief-justice, retiring from the bench in 1860. He was Professor of Jurisprudence at Dartmouth College in 1857–1861; removed to Boston in the latter year; and in 1867–1869 was special counsel for the United States in Europe, conducting numerous important legal matters in England and France. He was the author of "A Practical Treatise on the Law of Railways" (1857); "A Practical Treatise on Civil Pleading and Practice, with Forms" (with William A. Herrick, 1868); "The Law of Carriers and Bailments" (1869); etc. He died in Charlestown, Mass., March 23, 1876.

REDFIELD, WILLIAM C., an American statesman and manufacturer. Born in 1858, as a boy he entered the J. H. Williams Co. mill in Brooklyn and twenty years later became president of the firm. A Democrat in politics, he served as commissioner of public works under Seth Low in New York in 1902 and 1903, and in 1910 was elected to the House of Representatives. As a Democrat he was an opponent of high tariff and made several important speeches upon the subject. President Wilson appointed him Secretary of Commerce in 1913, a position which be resigned in 1919 because of ill health.

RED FISH, a species of fish (*Sebastes marinus*) found on the Atlantic coast of North America, a large red fish caught in considerable numbers for food. A smaller species (*S. viviparus*) receives the same name, and is called also red perch, rose fish, etc.

REDGRAVE, RICHARD, an English painter; born in London, April 30, 1804; in 1826 was admitted a student of the Academy, and was elected an A. R. A. in 1840, and R. A. in 1851. In 1857 was appointed Inspector-General of Art Schools, which office, with that of Surveyor of the Royal Pictures, he resigned in 1880, being then created a C. B. From 1825 to 1882 he contributed 145 pictures to the Academy, besides 40 sent elsewhere. He wrote, with his brother, "A Century of English Painters" (1866). He died Dec. 14, 1888.

REDGUM, strophulus; a popular disease with an eruption of minute hard, sometimes slightly red, clustered or scattered pimples on the face, the neck, or even the whole body of young infants. Cause, derangement of the stomach or intestines through improper feeding or from dentition.

RED GUM TREE, one of the Australian Eucalypti (*Eucalyptus resinifera*), yielding a gum resin valued for medicinal uses.

REDISCOUNTING, a financial practice little in use in this country, but quite common in European countries, where it is a large part of the general banking business. Instead of holding in their vaults notes or bills of exchange, where they are held as "dead" assets, the European banks employ them as currency and they are passed on, until finally they reach the central banking institution of the country. In other words, local institutions are able to put to active use the capital represented by such instruments.

RED JACKET, or, as he was termed by the Indians, SA-GO-YE-WAT-HA, a chief of the Senecas, of the Wolf tribe; born near the present site of Buffalo in 1752. His original name was O-TE-TI-ANI (Always Ready), his other name being

conferred on him when he was elected to the dignity of a sachem, and means, "He keeps them awake." His name of Red Jacket was conferred on him for the embroidered scarlet coat which he constantly wore. He first became known through the part he took in the treaty of Fort Stanwix in 1784. A council had been called to negotiate between the United States and the Six Nations for the cession of lands, and on the occasion he spoke eloquently against the proposed treaty, but without avail. In all his dealings with the whites in regard to land, Red Jacket was a strenuous defender of the rights of the Indians. His paganism never yielded to the influences of Christianity and he proved an inveterate enemy of the missionaries. Under his leadership the Senecas joined the Americans in the War of 1812 and in the battle of Chippewa behaved well as soldiers. In 1792 Washington, on the occasion of a treaty of peace having been signed between the United States and the Six Nations, gave Red Jacket a solid silver medal. On account of his intemperance he was deposed as chief of the tribe. He died Jan. 20, 1830. Red Jacket was on the warpath during both conflicts between the United States and Great Britain. He had great sagacity as a statesman, but lacked firmness of nerve.

REDLANDS, a city of California, in San Bernardino co. It is on the Santa Fe and the Southern Pacific railroads. Its beautiful situation makes it a popular health resort. It is the seat of the University of Redlands, and has a public library and many parks. It is the center of one of the greatest orange producing regions in the world. Its other industries include the manufacture of brick and lumber products. Pop. (1910) 10,449; (1920) 9,571.

RED MEN, IMPROVED ORDER OF, a social, fraternal, and benevolent secret organization founded on the customs and traditions of the aborigines of the American continent, and the oldest benevolent society in the United States of distinctively American origin and growth. The first authenticated Red Man's Society was organized in Philadelphia, Pa., early in 1772. On March 12, 1834, the "Red Men's Society, Tribe of Maryland," was organized in Baltimore, Md., shortly after (May 20, 1835) forming the Great Council of Maryland, and adopting the present name of the order. The order is composed of subordinate bodies called tribes, officered by a sachem, senior sagamore, junior sagamore, prophet, chief of records, keeper of wampum, and minor sub-chiefs. In each State possessing necessary membership a Great Council is constituted, composed of representatives from the various tribes under its jurisdiction, and officered by similar chiefs to the subordinate tribes, with the prefixed title of great. The Great Council of the United States is the supreme legislative body, and is composed of representatives from each Great Council. There is also a Degree of Pocahontas, to which women relatives of the members may belong. There are now about half a million members of the Order of Red Men, including some 50,000 women in the Pocahontas Degree. Over a million dollars is disbursed annually in benefits.

REDMOND, JOHN E., an Irish statesman and leader of the Irish Nationalist party in the House of Commons. Born in 1851, and educated at Trinity College, Dublin, he was early elected to Parliament, and after the passing of Parnell

JOHN E. REDMOND

became in 1900 the leader of the Irish party in Parliament. He believed it possible to obtain Home Rule for Ireland by propaganda in England and by wise Parliamentary leadership. For a time in 1913 his efforts seemed likely to be crowned by success when, after great difficulties, the Home Rule bill became a law. The World War, which broke out in 1914, caused Parliament to suspend the operation of the act until after the peace. In the interval came the Sinn

Fein movement, which rejected Home Rule and Redmond's leadership. He died in 1918, when, in spite of all his efforts, the relations between Ireland and England were more bitter than ever.

RED OCHER, a name common to a variety of pigments, rather than designating an individual color, and comprehending Indian red, light red, Venetian red, scarlet ocher, Indian ocher, reddle, bole, and other oxides of iron. As a mineral it designates a soft earthy variety of hæmatite.

REDOUBT, in fortification, a detached field work inclosed by a parapet, the salient points of which are but imperfectly or not at all protected by a flank fire. It may be square, star-shaped, or irregular in plan, according to the requirements of its site and surroundings. Also, an interior work within the main line of ramparts.

REDOUT KALÉ, a fortified post on the Black Sea coast of Russian Caucasia; in a marshy region at the mouth of a small river, about 10 miles N. of Poti. It was the chief shipping place for Circassian girls to Turkey, and was captured by the British fleet in 1854.

RED PINE, a species of pine (*Pinus rubra*), also called Norway pine. Its wood is very resinous and durable, and is much used in house and shipbuilding. It produces turpentine, tar, pitch, resin, and lampblack.

REDPOLE, or **REDPOLL**, in ornithology, a popular name for two species of the genus *Linota*, found both in the United States and in Europe, from the glossy blood red hue of the space from the forehead to behind the eyes. The mealy redpole, *L. canescens*, is larger than the lesser redpole, *L. linaria*, of which it has been regarded by some ornithologists as a race or variety.

RED RAIN, rain tinged red by cobalt chloride derived from meteoric dust.

RED RIVER, the lowest W. branch of the Mississippi, rises near the E. border of New Mexico, flows E. through Texas, forms what was the S. boundary of Indian Territory, thence S. E. through Arkansas and Louisiana, and enters the Mississippi below lat. 31° N. It is 1,600 miles long, and receives numerous branches, the Washita the most important. It is navigable for seven months to Shreveport (350 miles).

RED RIVER, or **SONG-KA**, a large river of Tonkin, formed by the junction of the Leteën and Song-shai, the former rising in China, the latter in Laos. It flows S. E., passes Hanoi, and falls by several mouths into the Gulf of Tonkin.

RED RIVER OF THE NORTH, a navigable river of the United States and Canada, rises in Elbow Lake, Minn., near the sources of the Mississippi, and flows S. and W. to Breckinridge, then N., forming the boundary between Minnesota and North Dakota, and so into Manitoba and through a flat country to Lake Winnipeg. Its course is 665 miles (525 in the United States). The Red River Settlement was the origin of Manitoba.

RED ROOT (*Ceanothus*), a genus of deciduous shrubs of the natural order *Rhamnaceæ*. The common red root of North America (*C. americanus*), which abounds from Canada to Florida, is a shrub of two to four feet high, with beautiful thyrsi of numerous small white flowers. It is sometimes called New Jersey tea, an infusion of its leaves being sometimes used as tea. It serves also as an astringent, and for dyeing wool of a cinnamon color. A Mexican species has blue flowers, and a California kind is used for evergreen hedges.

REDRUTH, a town of Cornwall, England, in the center of a great mining district, 9 miles W. by S. of Truro. It has a town hall (1850), public rooms (1861), a miners' hospital (1863). William Murdock here in 1792 first used gas for lighting purposes. Pop. about 11,000.

RED SEA, an arm of the Indian Ocean, running N. N. W. from the Gulf of Aden, with which it communicates by the Strait of Bab-el-Mandeb, 13½ miles across. Its length is about 1,200 miles, and its width in the central portion is between 100 and 200 miles, the greatest breadth being about 205 miles; it narrows toward the S. entrance, while in the N. it is divided by the peninsula of Sinai into two gulfs, the Gulf of Suez, 170 miles long by 30 miles wide, and the Gulf of Akaba, 100 miles in length.

The Arabian coasts of the Red Sea are usually narrow, sandy plains backed by ranges of barren mountains; the African coasts toward the N. are flat and sandy, but farther S. high table-lands rise some distance inland, culminating still farther S. in the lofty mountains of Abyssinia. A marked feature in the configuration of the Red Sea is found in the large existing and upraised coral reefs running parallel to both the E. and W. shores, those to the E. being more extensive and farther from the coast than those to the W.; the most important are the Farsian Archipelago in the E. reef, and the large island of Dahlak, lying off Annesley Bay, in the W. reef. In addition to the

islands of organic formation mention may be made of the volcanic group lying in lat. 14° N., the largest of which, Jebel Zugur, is 10 miles long, 7 miles wide, and 2,074 feet in height; farther N., on the islet of Jebel Teir, is a volcano which was active till quite recently. A dangerous reef, the Dædalus, lies directly in the path of steamers in lat. 24½° N., and a lighthouse has been placed on it. The principal harbors on the Red Sea are Mocha, Hodeida, Lokeyyah, Jiddah, and Yenbo, on the Arabian coast, and Massowah, Khor Nowarat, and Suakim on the African coast.

In ancient times the Red Sea was used as a means of communication by the Phœnicians and other maritime peoples, till the discovery of the route round the Cape of Good Hope diverted the traffic into another channel, only to be revived, however, on a much more extensive scale with the construction of the Suez Canal.

The tides are very variable, depending largely on the direction and force of the winds, which also to a great extent determine the direction and velocity of the surface currents. The hot climate is due to the almost cloudless sky, and consequent want of rain, the altitude of the sun, and the absence of rivers. The mean temperature of the air generally ranges between 70° and 94° F. during the day, though readings of over 100° are often registered in the shade; but during the night the temperature may fall to the freezing point, owing to radiation in the clear atmosphere. The prevailing wind on shore is N. N. W. almost universally, but from October to May S. S. E. winds prevail over the S. portions of the sea, a belt of calms and variable winds occurring in the central regions, while in the N. portions the usual N. N. W. winds are met with. Evaporation is very great, and the air over the water is always very moist in the summer; hurricanes are unusual, but rain squalls frequently occur with the S. winds, and moderate gales and sandstorms, called "dragons" in the popular language of the Arabs, are not uncommon.

The temperature of the water below the surface decreases down to a depth of about 200 fathoms, from whence down to the bottom a mean temperature of about 71° is found all the year round; this agrees with the temperature conditions prevailing in the inclosed seas of the East Indies, for instance, according to the observations made on board the "Challenger," the depth at which the minimum temperature occurs (*i. e.*, 200 fathoms in the Red Sea) indicating the depth of water over the barrier separating the sea from the open ocean. In winter, in the N. part, the whole body of water from surface to bottom usually has a mean temperature of 71°.

The salinity of the water is almost constant at about 1.030 (ordinary ocean water is about 1.026), and this is due to the fact that no rivers flow into it, little rain falls, and the evaporation is excessive. It has been estimated that, were the Red Sea entirely inclosed, it would become a solid mass of salt in less than 2,000 years, but this is prevented by an inflow of water through the Strait of Bab-el-Mandeb, and it is also known that a current of very salt water flows out underneath the incoming surface current.

The greatest depth in the Red Sea is about 1,200 fathoms, and the mean depth of the whole area about 375 fathoms. From the point of greatest depth, which is near the center, the bottom rises toward each end. Owing to the absence of rivers the deposits approach in character those formed in the open ocean, being largely composed of Foraminifera, Pteropods, and other pelagic shells. The marine fauna and flora are extensive, and have been described by Haeckel and other naturalists; it has been shown that a migration of the Red Sea and Mediterranean faunæ is taking place along the Suez Canal. The path by which the Israelites went out of Egypt was along the course of the valley called Wâdy Tumeilât, apparently an old arm of the Nile now silted up. The Lake of Ismailieh (Timsah) was then most probably the head of the Gulf of Suez, but the exact point of passage of this arm of the sea still remains obscure.

REDSHANK, a term applied to a Scotch Highlander having buskins of red deer skin, with the hair outward; used also in derision of his bare legs. In ornithology, the *Totanus calidris*, tolerably common over the greater part of Europe and Asia, from Iceland to China, retiring to the S. in winter. It derives its popular name from the color of the bare parts of its legs. The body is about the size of a snipe's, but the redshank, having longer wings, legs, and neck, appears the larger bird.

REDSTART, the *Ruticilla phœnicura;* common in Europe and western Asia, migrating S. in the winter. Forehead pure white, throat black, upper surface dark gray; breast, sides, and tail bright rust-red. It nests usually in a hollow tree or in a hole in a wall or rock, and lays five to seven delicate greenish-blue eggs, sprinkled with faint spots of red. The black, or black-capped redstart, *R. titys* (or *titis*) is common on the Continent, but has not the extended N. range of the common redstart. In the United

States the name is given to *Setophaga ruticilla*, a fly-catching warbler. Male, black with patches of orange-red. Female, olive with yellow patches.

REDUCTIO AD ABSURDUM, a species of argument much used in geometry, which proves not the thing asserted, but the absurdity of everything which contradicts it. In this way the proposition is not proved in a direct manner by principles before laid down, but it shows that the contrary is absurd or impossible.

REDUCTION, a word with several applications, as: (1) the act or process of reducing to any state or condition; the state of being reduced; as, the reduction of a substance to powder. (2) the act of reducing or bringing into subjection; conquest, subjugation; as, the reduction of a kingdom or fortress. (3) the act of reducing or diminishing in size, dimensions, value, quantity, force, etc., diminution, abatement; as, the reduction of expenses, the reduction of forces. (4) the amount, value, quantity, etc., by which anything is reduced or lessened; as, he made a reduction of 5 per cent. (5) the act or process of making a copy of a figure, map, plan, design, etc., on a smaller scale than the original, but preserving the form and proportion.

RED WATER, the hæmaturia in cattle, occurring occasionally in sheep. It is of two kinds: (1) Acute, ushered in by a discharge of bloody urine, generally preceded by dysentery, suddenly changing to obstinate costiveness immediately before the red water appears. There is laborious breathing, with every indication of fever. The disease rapidly runs its course, and the beast soon succumbs. (2) Chronic, the more prevalent form. The urine is brown or yellowish-brown, the beast feeds fairly, but ruminates slowly, and after a few days a natural diarrhœa carries off the evil symptoms. Youatt considers these two forms essentially different maladies; the first, inflammation of the kidney; the second, inflammation of, or altered secretion from the liver.

REDWAY, JAQUES WARDLAW, an American geographer; born Murfreesboro, Tenn., in May, 1849; studied at the University of California and at Munich, Bavaria; became instructor of chemistry at the former institution and professor of physical geography and chemistry at the State Normal School of California. He engaged in mining in California and Arizona; traveled in South America, Europe, and Asia for the purpose of pursuing geographical investigations, and was author of several treatises on physical geography, etc., among them "Modern Facts and Ancient Fancies in Geography"; "Climate and the Gulf Stream"; "A Treatise on the Projection of Maps"; and a Geography in 1902.

REDWING, the *Turdus iliacus*, a European thrush, closely allied to the common thrush, but with red instead of gold color on the wings. It feeds on worms, slugs, and berries injurious to man. Called also red-sided thrush, wind thrush, and swine-pipe. The name is also given to a North American passerine bird, *Agelaius phœniceus*, of the family *Icteridæ*. Male, black with red spots, bordered with orange, on the wings.

REDWING, a city and county-seat of Goodhue co., Minn.; on the Mississippi river, and on the Chicago, Milwaukee, and St. Paul, and the Chicago Great Western railroads; 41 miles S. E. of St. Paul. Here are electric lights, public library, city hospital, Hage Seminary, State Training School, and Redwing Seminary (Luth.). The city is a great market for wheat, its chief article of export. It has manufactures of flour, steam engines, agricultural machinery, lumber, doors, sash, and blinds. Pop. (1910) 9,048; (1920) 8,637.

REDWOOD, the name of various sorts of wood of a red color, as an Indian dyewood, the produce of *Pterocarpus santalinus;* the wood of *Gordonia Hæmatoxylon*, the redwood of Jamaica; that of *Pterocarpus dalbergioides*, or Andaman wood; that of *Ceanothus columbrinus*, the redwood of the Bahamas; that of *Sequoia sempervirens*, a coniferous tree of California, the redwood of the timber trade; that of *Soymida febrifuga*, of which the bark is used in India for fevers, and has been employed successfully in Europe for typhus. The California redwood is the best known. The tree reaches a very great size, and forms forests in the coast mountains of California.

REE, LOUGH, a lake of Ireland, formed by the Shannon, between the counties of Longford, Westmeath, and Roscommon, 17 miles long and 1 mile to 6 miles broad, studded with islands.

REEBOK, or **RHEEBOK**, the *Antilope capreolus* (*Pelea capreola*), from South Africa. Length about 5 feet, height at shoulder 30 inches; uniform ash color on neck, shoulders, sides, croup, and thighs, white or light gray on under surface and inside of limbs. They live in small groups of five or six individuals.

REED, in music, the sounding part of several instruments, such as the clari-

onet, bassoon, oboe, and bagpipe, so called from its being made from the outer layer of a reed (*Arundo sativa* or *donax*) found in the S. of Europe. The name is also applied to the speaking part of the organ, though made of metal. Reeds are generally divided into two kinds—the beating reed, used in the organ, clarionet, etc., requiring to be placed within a tube to produce a musical sound, and the free reed, used in instruments of the harmonium and concertina kind.

REED, ANDREW, an English philanthropist; born in London, England, Nov. 27, 1787; was educated in his native city and in 1811 was there ordained pastor of an independent congregation. He visited the United States in 1834, where he studied educational and religious conditions. In 1813 he established the London Orphan Asylum; in 1827 the Infant Orphan Asylum; in 1847 the Asylum for Fatherless Children in Croydon; and later the Royal Hospital for Incurables and the Royal Asylum for Idiots. He was the author of "Martha" (1836); "The Day of Pentecost"; "The Revival of Religion" and "Earnest Piety Essential to Eminent Usefulness" (1839); and "Advancement of Religion the Claim of the Times" (1847); etc. He died in London, England, Feb. 25, 1862.

JAMES A. REED

REED, JAMES A., United States Senator from Missouri; born in Ohio in 1861, he was educated at Coe College, Iowa, and admitted to the bar at Cedar Rapids in the same State. In 1887 he moved to Missouri, where he became a leader in the Democratic party in the State. From 1900 to 1904 he served as mayor of Kansas City, and was elected to the Senate for the term 1911–1917. In 1917 he was re-elected, and during this term he broke from the leadership of President Wilson and became one of the bitterest opponents of the League of Nations as championed by the President.

REED, THOMAS BRACKETT, an American statesman; born in Portland, Me., Oct. 18, 1839; was graduated at Bowdoin College in 1860; studied law; appointed assistant paymaster United States navy in 1864; admitted to the Portland bar; member of the Maine Legislature 1868–1869, and of the Senate 1870; State attorney-general, 1870–1872; member of Congress 1877–1899; and speaker of 51st, 54th, and 55th Congresses. In 1896 Mr. Reed was a prominent candidate for the Republican presidential nomination. He resigned from Congress in 1899, and entered the practice of law in New York City. He died in 1902.

REED BUNTING, the *Emberiza schæniclus*, common in swampy places, all over Europe, length of male, six inches; head, chin, and throat black; belly and nuchal collar white; upper surface brownish black, each feather bordered with bright bay. Called also reed sparrow.

REED COLLEGE, an educational institution at Portland, Ore. It is coeducational and non-sectarian. In 1919 it had 338 students enrolled in its arts and science course, and had a faculty numbering 20. The college has an endowment of over $3,000,000. The president is William T. Foster.

REED MACE, a plant of the genus *Typha*, natural order *Typhaceæ*. Two species are common, *T. latifolia*, or greater reed mace, and *T. angustifolia*, the lesser. These plants are also known by the name of cat-tail, and grow in ditches and marshy places, and in the borders of ponds, lakes, and rivers. They are sometimes erroneously called bulrush.

REED WARBLER, the *Acrocephalus streperus*, a summer migrant to temperate Europe late in April, and leaving late in September. It is an incessant songster, and its notes are varied and pleasing. The male is about 5½ inches long, upper surface uniform pale brown, with a tinge of chestnut; chin, throat, and belly white.

REEF, a chain, mass, or range of rocks in various parts of the ocean, lying at or near the surface of the water.

REEF KNOT, in nautical language, a knot formed by passing the ends of the two parts of one rope through the loop formed by another w' ose two ends are similarly passed through a loop on the first; the two parts of one rope are passed above, and of the other below the loop through which they are inserted. A longitudinal pull tightens the knot, which can only be untied by pushing the loops in opposite directions.

REEL, a revolving contrivance on which fiber, thread, cord, rope, fabric, etc., are wound, to form them into hanks or skeins, and for various other purposes; applied to:

Agriculture, a device having radial arms carrying horizontal slats, and rotated by gear or pulley connected with the axle of a harvester, for pressing backward and holding the stalks of grain in position for being severed by the knives. Angling, a skeleton barrel attached to the butt of a fishing rod, around which the inner end of the line is wound, and from which it is payed out as the fish runs off with the bait, and is gradually wound in again as his struggles become less violent, bringing him to land or to the landing net. Baking, a cylinder with radial arms rotating in a heated chamber, carrying pans in which loaves of bread are placed for baking in the reel-oven. Cotton machinery, a machine on which cotton is wound, making hanks of thread, each 840 yards in length. Domestic, a spool or bobbin of wood on which cotton, thread, silk, etc., is wound for use in sewing. Milling, the barrel or drum on which the bolting cloth is fastened. Nautically, a revolving frame to hold a line or cord, as: (*a*) the log-reel; (*b*) the deep sea-reel; and (*c*) the spun-yarn-reel, etc. Rope-making, spun-yarns are wound on a reel preparatory to tarring or laying up into strands as the twisting of each length is completed. Silk-making, the revolving frame on which silk is wound from the cocoons, or yarn is wound off from the spindle of a hand-spinning machine, and reeled into cuts or hanks. Telegraphy, a barrel on which the strip of paper for receiving the message is wound in a recording telegraph.

REEL, a lively rustic dance, peculiar to Scotland. In the United States, the Virginia reel is widely popular. Also the music for such a dance, generally written in common time, but sometimes in jig time of six quavers to a bar.

RE-ENTRY, in law, the resuming or retaking the possession of lands lately lost. A proviso for re-entry is a clause usually inserted in leases, that upon nonpayment of rent, etc., the term shall cease.

REEVE, the title of the official existing in early times in England, who was appointed by the king to carry into execution the judgments of the courts presided over by the ealdorman (earl) and other high dignitaries, to levy distresses, exact the imposts, contributions, tithes, and take charge of prisoners.

REEVES, JOHN SIMS, an English singer; born in Shooters' Hill, Kent, Oct. 21, 1822. At 14 he was a clever performer on various instruments, and was appointed organist and director of the choir in the church of North Cray in Kent. He first appeared in public as a baritone at Newcastle in 1839. This début was a complete success; and he acquired fresh fame, but as a tenor, in London. In order to perfect his voice and style he studied at Paris (1843) for some time, and then appeared at Milan in the tenor part of Edgardo in "Lucia di Lammermoor." He returned to England in 1847, and, at Drury Lane as Edgardo, was immediately recognized as the first English tenor. He was engaged in 1848 at Her Majesty's Theater, and in 1851 sang as first tenor at the Italian Opera in Paris. After 1860 he became popular all over the country as a ballad singer at concerts. He especially excelled in singing oratorio parts, his first oratorio rôle having been in "Judas Maccabæus" in 1848. He died in 1900.

REFERENCE, the act or process of assigning a cause depending in court, or some particular point in a cause for hearing and decision, to a person or persons appointed by the court.

REFERENDUM, a system of legislation which consults all the electors of a State as to whether new laws shall be confirmed. In some cantons of Switzerland a method resembling the referendum has been practiced since the 16th century. The present form was adopted in the canton of St. Gall in 1830. In 1848, in spite of Conservative opposition the referendum was, by the action of the Radicals, incorporated in the Swiss federal constitution, and in 1874 its application was extended. In all the Swiss cantons, except Freiburg, the referendum is now established. According to the Swiss federal constitution, all constitutional amendments must be ratified by the Swiss electorate before they become law. Other measures must be sub-

mitted to the popular vote, if demanded within 90 days after their publication by 30,000 voters, or by the government of eight cantons. During the 17 years, 1874 to 1891, out of 149 laws, 27 were referred to the people; of these 15 were rejected. The referendum has worked so well that it has conquered all opposition to it, and it is now generally regarded as a check on hasty and class legislation. It will be observed that the essence of it is that it submits to the people a single and clear issue upon which they may give their decision. There exists also an obligatory referendum in eight cantons, where every law and every expenditure beyond a fixed maximum must be submitted to the mass of the electors, and it is not necessary that a demand for this submission to the electors should be made. In Great Britain what may be termed a kind of local referendum with regard to the "Adoptive Acts" was set up by the Parish Councils Act of 1894. There is a growing demand in the United States for the general introduction of direct legislation by means of the referendum, and in several places the system is practiced.

REFINING OF METALS, the processes by which the various metals are extracted from their ores, and obtained in a state of purity. See the articles on the several metals.

REFLECTING CIRCLE, an instrument for measuring altitudes and angular distances, invented by Mayer about 1744, and afterward improved by Borda and Troughton. In principle and construction it is similar to the sextant, the graduations, however, being continued completely round the limb of the circle. Also called a repeating circle.

REFLECTING GALVANOMETER, Sir William Thomson's instrument, consisting of a very small magnet, made of a piece of watch spring, suspended between two flat bobbins of fine insulated copper wire. The magnet carries a very small concave mirror, which is adjusted by means of a directing magnet to throw the rays of light, issuing from a lamp and reflected from the mirror, on the zero of a horizontal graduated scale when no current is passing, or when two equal and opposite currents neutralize each other. In any other case the vibrations of the magnet cause the image to be deflected to the right or left of zero by an amount proportional to the force and duration of the current.

REFLECTING MICROSCOPE, a form of microscope first proposed by Newton, in which the image formed by a small concave speculum may be viewed either by the naked eye or through an eyepiece. The object is placed outside of the tube of the microscope, and reflects its image to the speculum by means of a plane mirror, inclined at an angle of 45° to the axis of the former.

REFLECTING TELESCOPE, a telescope in which the rays are received on an object-mirror and conveyed to a focus, at which the image is viewed by an eyepiece.

REFLECTION, that which is reflected, or produced by being reflected; an image given back from a reflecting surface. Also the act or habit of turning the mind to something which has already occupied it; thoughtful, attentive, or continued consideration or deliberation; meditation, thought.

A surface on which a beam of light falls may be either rough or smooth. If it be rough, the greater part of the incident light is irregularly scattered by the innumerable surface facets, so as to be reflected or dispersed in all directions; if it be smooth, a proportion (but never the whole) of the incident light is regularly reflected or turned back in definite paths. A smooth, dustless mirror is not visible to an eye outside the track of rays reflected from it. If the polished surface be that of a transparent substance (*e. g.*, glass) optically denser than the medium conveying the light to it, comparatively little light is reflected; but the more oblique the incidence, the smoother the polish, and the greater the difference between the optical density of the glass and that of the medium in which it is immersed, the greater the proportion reflected. Thus less light is reflected from glass under water than from glass in air; and conversely, if the light travel in the denser medium and strike the bounding surface between it and a rarer medium—as where light ascending through water strikes its upper free surface—it will, if its obliquity of incidence exceed a certain limit, be almost totally reflected; the small loss that ensues arising wholly from absorption, while no light is transmitted into the air above. This may be shown by holding a clear tumbler of water above the head; the image of objects beneath is seen reflected in a bright mirror surface; and a phenomenon of the same order is seen on thrusting a test tube containing air below the surface of water, when it will appear to have a luster like quicksilver. If the reflecting surface be that of an opaque body the bulk of the incident light is reflected, a percentage being lost by absorption. What has been said about light applies equally to ether undulations

of all kinds, and therefore the theory of reflection has general reference to radiant heat, light, actinic radiation, and electro-magnetic undulations. Reflection arises in all cases from a difference in the transmissibility of ether disturbances on the two sides of the bounding surface.

On reflection from polished surfaces we have, so far as regards the directions of the reflected rays, the following laws observed: (1) The incident "ray," the normal (*i. e.*, a line drawn perpendicular) to the surface at the point of incidence, and the reflected "ray" all lie in one plane, the "plane of incidence"; and (2) the angle of incidence (the angle which the incident "ray" makes with the normal to the reflecting surface) is equal to the angle of reflection (the corresponding angle between the normal and the reflected "ray"). These laws apply equally to ether waves of all lengths, and therefore to light of all colors; and they also hold good whatever be the shape of the surface. If the surface be plane their application is simple; and if the surface be curved we have, in effect, to consider the curved surface as made up of indefinitely small facets, to each of which the above laws can be applied. The geometrical consequences of these laws make up what used to be called catoptrics, that part of geometrical optics which deals with reflection; and this coincides in its propositions with that part of kinematics, which gives an account of the reflection of waves. Here the other waves (using the term "waves" in its most general sense) are assumed to travel through optically homogeneous media, and can consequently be traced out by imaginary lines drawn at right angles to the wave fronts or along the directions pursued by the waves, these imaginary lines being called "rays."

Plane Reflecting Surfaces.—(1) Rays which are paralled to one another before striking a plane reflecting surface are parallel after reflection. (2) If light diverging from or converging toward a point be reflected from a plane mirror, it will appear after reflection to diverge from or converge toward another point situated on the opposite side of the mirror and at an equal distance from it. If, on the other hand, the course of the light is such that the rays appear before reflection to converge on the second point, they will after reflection actually pass through the first one. (3) A consequence of the preceding proposition is that when an object is placed before a plane mirror the virtual image is of the same form and magnitude as the object, and at an equal distance from the mirror on the other side of it. The right hand of the image taken as looking toward the mirror, is necessarily opposite to the left hand of the object; so that no one ever sees himself in a single plane mirror as others see him or as a photograph shows him, but he sees all his features reversed. (4) When two mirrors are placed parallel to one another, light from an object between them is reflected back and fore, so as to appear on each occasion of reflection as if it came from images more and more remote from the mirrors. On each occasion the course of the rays of light is the same as if the virtual image behind the mirror had been a real object; and a new virtual image is produced, apparently as far behind the reflecting mirror as the virtual object had been in front of it. If the mirrors were perfectly plane and parallel, and if they reflected all the light which fell on them, an observer between the mirrors would see in this experiment (which is called the endless gallery) an indefinite number of images. A variation of this experiment, carried out with mirrors not parallel to one another, but inclined at an angle which is some aliquot part of 180°, gives the principle of the kaleidoscope. (5) When a beam of light is reflected from a mirror and the mirror is turned through a given angle, the reflected beam is swept through an angle twice as great. This principle is utilized in the construction of many scientific instruments, in which the reflected beam of light serves as a weightless pointer, and enables us to measure the deflection of the object which carries the mirror. (6) When a beam of light is reflected at each of two mirrors, inclined at a given angle, the ultimate deviation of the beam is (if the whole path of the light be within one plane) equal to twice the angle between the mirrors. This proposition is applied in the quadrant and sextant. (7) When a wave of any form is reflected at a plane surface it retains after reflection the form which it would have assumed but for the reflection, this form being, however, guided by reflection into a different direction.

Curved Reflecting Surfaces.—In these we have to trace out the mode of reflection of incident rays from each "element" or little bit of the reflecting surface; and this leads, through geometrical working, to such propositions as the following: (1) Parallel rays, traveling parallel to the axis of a concave paraboloid mirror are made to converge so as all actually to pass accurately through the geometrical focus of the paraboloid; and, conversely, if the source of light be at the geometrical focus, the rays reflected from the mirror emerge parallel

to one another—a proposition of great utility in lighthouse work, search-lights, etc. (2) If the paraboloid mirror be convex, parallel incident rays have, after reflection, the same course as if they had come from the geometrical focus of the paraboloid. (3) In a concave ellipsoid mirror, light diverging from one "focus" of the ellipsoid is reflected so as to converge on the other "focus" of the curved surface; and by a convex ellipsoidal mirror light converging toward the one focus is made to diverge as if it had come directly from the other focus. (4) In a hyperboloid reflector the two geometrical foci have properties corresponding to those of the ellipsoid. (5) In spherical reflectors, which are those most easily made, there is no accurate focus except for rays proceeding from the center and returning to it. When parallel rays are incident on a concave spherical mirror we see that if they be parallel to the axis of the mirror each ray is made to pass after reflection through a point, which is nearer to a point midway between the mirror and its center, the narrower is the pencil of rays. If therefore, the pencil of rays be very narrow in comparison with the radius, the rays will, after reflection, approximately converge on the midway point, which is called the principal focus of the mirror. The reflected rays from the various parts of the mirror form by their intersection a caustic, the apex or cusp of which is at the midway point.

As to the quality of the light reflected there are some peculiarities to be observed. From the surface of a transparent body, of greater optical density than the surrounding medium, light polarized in the plane of incidence and reflection is more largely reflected at oblique incidences than light polarized at right angles to that plane; when the angle of incidence is such that the reflected and refracted rays tend to be at right angles to one another, the whole of the light reflected is polarized in the plane incidence and reflection; and if light polarized at right angles to that plane be made to fall on glass at the particular angle of incidence just referred to, it will not be reflected at all, but will wholly enter the glass. Plane-polarized light polarized in any other plane than that of incidence or one at right angles to it, is, after total reflection in glass, found to be elliptically polarized; and this phenomenon is always presented in reflection from metals. In the case of electro-magnetic radiation theory and practice concur in indicating that conductors are good while non-conductors are bad reflectors; and the same general proposition holds good with reference to those more frequent but otherwise similar ether oscillations to which the phenomena of radiant heat, light, and actinism are due.

REFLECTION OBSERVATIONS, in astronomy, those which measure the direction of a beam of light which has been reflected from the surface of some liquid, generally mercury. Sometimes it is a beam from a heavenly body, as in sextant observations with an artificial horizon, or in measuring the reflected zenith distance of a star with a meridian circle in an observatory, and sometimes it is a beam of light, or rather the want of light, which makes the shadow of the wires of a transit or meridian circle from a lamp used in the nadir observations of an observatory.

REFLECTOR, that which reflects, or throws back rays of light, heat, etc.; a reflecting surface. In optics, a device by which the rays proceeding from a luminous or heated object are thrown back or diverted in a given direction. The reflecting surface may be either plane or curved. In practice it is often made spherical or parabolic. A mirror is a familiar example of a plane reflector. The material should be as smooth and highly polished as possible. Sheet tin is frequently used for common purposes, as for door, hall, or vehicle lamps, while for other purposes a more perfectly reflecting surface is employed, such as speculum metal or silver protected by glass. Silver is the most perfectly reflecting substance known, absorbing but 9 per cent. of the incident rays, while speculum metal absorbs 37 per cent. Glass itself, owing to its property of totally reflecting incident rays at a low angle, is used in certain cases. Reflectors with parabolic surfaces are employed for throwing the light emanating from objects placed in their foci in parallel straight lines to a great distance, and for converging the heat rays from a distant object, as the sun, to a focus, and also, in connection with eye glasses, in the reflecting telescope, which is itself often simply denominated a reflector.

REFLEX NERVOUS ACTION, in physiology, those actions of the nervous system whereby an impression is transmitted along sensory nerves to a nerve center, from which again it is reflected to a motor nerve, and so calls into play some muscle whereby movements are produced. These actions are performed involuntarily, and often unconsciously, as the contraction of the pupil of the eye when exposed to strong light. See NERVE.

REFORM ACTS, a term applied to certain acts of the British Parliament by which the regulations as to the parliamentary representation of the people were altered, and especially to those of 1832, 1867, and 1884–1885. The first two acts provided both for an extension of the franchise and for a redistribution of seats. The Reform Act of 1832 disfranchised 56 rotten boroughs with less than 2,000 inhabitants each, and returning 111 members; 30 boroughs with less than 4,000 inhabitants, and two above that number, lost each a member, and thus 143 seats were obtained for distribution. Forty-three new boroughs were created, 22 of which received two members each, and 21 one member each. The county members for England and Wales were increased from 95 to 159, 26 of the large counties being divided, and a third member given to seven important county constituencies. Scotch and Irish Acts followed; the Scotch representation, fixed by the Act of Union at 45 was raised to 53 (30 of them given to counties and 23 to cities and boroughs), and the Irish members fixed by the Act of Union at 100, were increased to 105. The Reform Act of 1867 disfranchised 11 small English boroughs, took a member from 35 more, and two from Scotch counties, which with four seats obtained from boroughs disfranchised for corruption, gave 52 seats for redistribution. Five of these were given to as many large English and Scotch boroughs on the three-cornered system, and three to universities, the others to old or new county or borough divisions. Seven members were added to Scotland. There was no redistribution in Ireland. In the third successful effort for parliamentary reform, that of 1884-1885, the franchise and redistribution of seats constituted two distinct acts. The franchise bill received the royal assent on Dec. 6, 1884, and came into operation on Jan. 1, 1885. It established household and lodger franchise in the counties, introduced a service franchise, diminished, though it did not destroy, fagot voting, and made a uniform occupation franchise of $50 rent both in counties and in boroughs in place of the three formerly existing. It left untouched the 40-shilling freeholders of inheritance, and conferred votes on copyholders possessing land of greater value than $25 annually. By the Redistribution Act of 1885, 81 English, 2 Scotch, and 22 Irish boroughs were totally disfranchised; 36 English and 3 Irish boroughs, each lost a member, as did two English counties; the city of London was reduced from four to two; six seats were obtained from places disfranchised for corruption, and the members of the House of Commons were increased by 12. The seats thus obtained for redistribution were 180. The great feature of the scheme which followed was the separation of populous boroughs and counties into divisions, each returning a single member. Only a few places hitherto with two members were left with the old arrangement. England has now 465 members, Wales 30, Scotland 72, and Ireland 103, the reduction from 105 occurring through the disfranchisement of Sligo and Cashel some years ago for corruption.

REFORMATION. The religious revolution of the 16th century, known as the Reformation, is the greatest event in the history of civilization since Paganism gave place to Christianity as the faith of the leading nations of the world. It marks the supreme importance of this revolution that the age which preceded and the age which followed it belong to two different phases of the human spirit. With the Reformation begins what is distinctively known as Modern Europe, while the epoch that preceded it bears the equally distinctive designation of the Middle Ages. In the articles on Luther, Charles V., Henry VIII., Calvin, Knox, and others details will be found regarding the aims and methods of the revolution in the various countries where it declared itself. Here, therefore, it will be sufficient to indicate briefly the general causes which produced it, the special course and character it took among the different peoples, and its chief results for the human spirit at large.

The central fact of the Reformation was the detachment from papal Christianity of the nations distinguished by the general name of Protestant. By this severance an order of things came to an end under which Christian Europe had been content to exist from the close of the 8th century. From the year 800, when, by a mutual understanding of their respective functions, Charlemagne was crowned emperor of the Romans by Pope Leo III., western Europe had come to regard the papacy as the essential condition of individual and corporate life, as a prime necessity in human affairs. Thus conceived, the power of the Church underlay all human relations. It was the consecration of the Church that constituted the family; the Church defined the relations of rulers and their subjects, and the Church was the final court of appeal on the ultimate questions of human life and destiny. In the nature of things such a power could never be realized as it was ideally conceived. Yet during the 11th and 12th centuries, the period when the power of the Popes was

most adequate to their claims, they undoubtedly went far to make the idea a reality. But the energies of the human spirit were bound sooner or later to issue in developments with which mediæval conceptions were fundamentally irreconcilable. But in the 13th century along every line of man's activity, there were protests, conscious and unconscious, against the system typified in the Roman Church.

The most remarkable of these protests was the order of ideas associated with the name of Joachim of Flora in Calabria (died 1202). Under the name of the "Eternal Gospel" (used for the first time in 1254) these ideas ran a course which for a time seriously threatened the existence of the mediæval Church. The new teaching struck at the very root of the papal system, for its essence was that the hour had come when a new dispensation, that of the Holy Spirit, should supersede the provisional Gospel delivered by Christ. During the second half of the 13th and the first half of the 14th century the influence of these ideas is traceable in every country of Christendom, and it was only the unflinching action of the Church that postponed its disintegration for over three centuries. Numerous sects which either sprang from or were quickened by this movement speak clearly to the revolutionary fever that had seized on men's spirits and was impelling them to other ideals than the traditions of Rome. Mainly the offspring of the third order of St. Francis, these sects swarmed throughout every Christian country under the names of Beguins, Bekhards, Fratricelli, Flagellants, Lollards, Apostolic Brethren, etc., and everywhere spread discontent with the existing Church. Even John Knox (in answer to a letter by James Tyrie, a Scottish Jesuit) claims Joachim of Flora as an ally in the work which it was the labor of his own life to achieve—the change of the papacy, and the promotion of what he deemed a pure Gospel.

Simultaneously with this manifestation of revolutionary feeling there were tendencies in the sphere of pure thought in essential antagonism to the teaching of the Church. The labor of the thinkers of the Middle Ages was to reconcile faith, as inculcated by religious authority, with human reason as they found it embodied in the accessible writings of Aristotle. In the 13th century, the Arabic texts of Aristotle, and notably that of the great commentator Averrhoes, made their way into the Christian schools, and thenceforward a leaven of skepticism was a present element in all the universities of Europe. As a result of the teaching of Averrhoes, a name of the most sinister import to every true son of the Church, materialism and pantheism became common creeds among thinkers, and the notion spread even among intelligent laymen that Christianity was not the absolute thing the Church had taught them to believe. In Dante's (died 1321) fierce exclamation that the knife is the one reply to him who denies the immortality of the soul we have the outburst of a passionate faith in presence of a wide-spread libertinism of thought.

But the most serious menace against the integrity of the papal system lay in the political development of Europe during the last three centuries of the Middle Ages. As the countries of western Europe became more and more individualized, their peoples grew every year into a fuller consciousness of distinct national interests and national ideals. While this was the tendency of the various nations, the Pope during these centuries gradually lost his position as the disinterested umpire of Europe, and sank into an Italian prince, with a temporal policy of his own which led him to seek allies among other potentates, as they fell in with his own special ends of the moment. But such alliances naturally gave offense to the princes excluded from them, and led to a suspicious discontent with the Roman see, which, as was afterward proved in the case of England, needed only the requisite occasion to flame into outright rebellion. The saying of Philip Augustus (died 1223)—"Happy Saladin, who has no Pope!"—expressed the feeling which every century grew stronger, that the Pope would become an impossible factor in European politics. To this feeling should be added the fact that, as the middle classes grew in intelligence and well-being they looked with envy on the immense wealth of the clergy, and grumbled at the large sums that annually went to the coffers of Rome.

During the 14th and 15th centuries mediævalism gave every sign of a harmonic phase of human development. By the so-called Babylonish Captivity, when the papal residence was fixed for 70 years at Avignon (1305–1376), and by the Great Schism (1378–1417), during which the spectacle was seen of first two and afterward three Popes claiming to be the vicars of God on earth, the papacy suffered a loss of prestige in the eyes of all Europe which it never afterward fully recovered. It was the further misfortune of the Church during this eclipse of its ancient glory that spiritual life seemed to have gone out of every rank of its clergy. Testimonies from every country prove beyond ques-

tion that by the end of the 15th century the clergy had become often illy, sometimes grossly, unfit to be the spiritual guides of the people. The sources of intellectual life had equally failed wherever the old philosophy authorized by the Church continued to be the subject of teaching and study. In the later half of the 15th century scholasticism had become the veriest casuistry which ever engaged the mind of man. In all the interests of man's well-being, therefore, a renaissance was needed to evoke new motives and supply new ideals which should lift humanity to a higher plane of endeavor. Such a renaissance came and evolutionally the Church did not prove equal to suppressing this second burst of life as it had suppressed that of the 12th and 13th centuries.

It was again in Italy that the new life first declared itself. While N. of the Alps scholasticism reigned in all the schools, the movement known as the Renaissance had in Italy been in full course for above a century. In itself the Renaissance was as far as possible from leading men to higher ideals in religion, yet in two of its results it gave a direct impetus to the Reformation. Inspired by the life of antiquity, the humanism of the Renaissance paganized the Church and quickened that moral disintegration which was the prime cause of the religious revolution. On the other hand, through its opening of men's minds by new studies, and new measures of things, the Renaissance lightened the load of tradition, and made a new departure in the life of Christendom a less formidable conception. In Erasmus (1467-1536), who has always been regarded as a true nursing father of the Reformation, we clearly discern these two results of the revival of the ancient literatures. In so many words he states his grave fears lest the Church should be wholly paganized by the universal imitation of classical modes of thought and speech; while his own unsparing criticism of the Church and its traditions proves how much he owed to the so-called "new learning."

The very zeal with which the revival of antiquity was pursued in Italy was itself a countercheck to religious reform in the country that of all others needed it the most. All contemporary literature proves that during the later part of the 15th and the opening of the 16th century the court of Rome was as profoundly immoral as that of any of the heathen emperors had been in the same city. The spiritual claims of the papacy were the jest of ecclesiastics themselves. "This fable of Christ," a certain dignitary of the Church is reported to have said in the Vatican, "has been to us a source of great gain." Among the Italian people, however, there was never the slightest indication of a national movement toward any serious breach with the papacy. The religious melodrama enacted by Savonarola at Florence (1489–1498) never struck at the central ideas of papal Christianity; and Savonarola, besides, never like Luther or Knox woke a deep response in the national consciousness. While in Italy, therefore, there was no widespread religious quickening as in other countries of Christendom, there was no political reason such as elsewhere produced a breach with the papacy. For the Italian people the Pope was not a foreign prince with temporal interests of his own conflicting with those of the nation at large. The different republics which partitioned the country might at times regard the Pope as an enemy to their individual ambitions; but the nation as a whole was fully conscious of the honor of having the vicar of God in their midst, and as in the past they had stood by him against the emperors, so in the great religious revolution of the 16th century they also remained faithful to him throughout the gradual dismemberment of his spiritual dominion.

Of the countries N. of the Alps Germany was the first to be widely influenced by that revival of learning which had its origin in Italy. In Germany, however, the new spirit wrought under fundamentally different conditions, and lighted the way to vastly different issues. There was every reason why Germany should lead the way in the schism from Rome. Outside Italy Germany was the country where every abuse of the mediæval Church was seen in its fatalest form. The ignorance and sensuality of the clergy, the scandalous sale of livings, the disproportionate papal exactions—all these evils came to be vividly realized by the quickened consciousness of the nation. Between Rome and Germany, moreover, an antagonism existed in the very conditions from which mediævalism had sprung. It was in virtue of the mutual understanding between Pope and emperor that the Church came to fill the place it did in western Europe. But almost from the first the interests of Rome and the empire had been in collision, so that Pope and emperor came to be mere rivals for the first place among the Western powers. It was natural, therefore, that in Germany Rome should be regarded with a jealousy and suspicion which might easily grow into irreconcilable hostility.

These workings of the national mind

found intensified expression in the acts and writings of Martin Luther, who, with a genius and audacity which have given him a place among the molders of man's destinies, proclaimed the need of a new departure in the religious life of humanity. In rejecting the traditional claims of the papacy Luther at the same time supplied a new principle by which, as he contended, a higher and truer life of the soul might be lived. By his doctrine of Justification by Faith Luther threw each individual on his own responsibility for the reason and life which is intrusted to him. Hitherto the deepest concerns of men had been inextricably bound up with Pope and priest, and in this had lain the essential principle of mediæval Christianity. By the new principle Luther made the Pope no longer an indispensable factor in individual or corporate life, and thus initiated a new phase in the development of society. As was to be expected, this principle, so organic in its working, cleft the German nation in twain, and gave rise to a struggle which did not close till more than a century after the death of Luther himself. Luther's attack on the sale of indulgences (1517), the burning of the papal bull (1520), Luther's condemnation by the Emperor Charles V. at the Diet of Worms (1521), his temporary triumph at the first Diet of Spires in 1526 (the beginning of modern Germany, according to Ranke), the confession of the Protestant faith at Augsburg (1530), are the outstanding events in the contest closed by the peace of Augsburg in 1555, nine years after Luther's own death, but again renewed in the disastrous Thirty Years' War (1619-1648), and finally settled by the peace of Westphalia (1648).

The religious revolt of Germany left no country of Christendom unmoved. Before the 16th century had closed the bulk of the Teutonic peoples had followed her example and broken with the papacy. Under one aspect, indeed, the Reformation may almost be regarded as a Teutonic revolt against the domination of the Latin races. Between 1525 and 1560 Denmark and Sweden, taking the occasion of a political revolution, both declared for Protestantism; and in 1581, the United Provinces definitively threw off their double allegiance to Spain and the Pope. But it is more important to trace the course of the revolution in the great powers of the West.

In Spain heresy of all kinds had no chance of finding a home. In its hated Inquisition, reorganized in 1478, it had an institution ready made for effectually dealing with all attempts at reform or revolution. Luther found followers in Spain as in other countries; but they were literally extinguished before their voices could be heard, and of all the great powers Spain profited least by the evolutionary spirit of the Reformation.

Much more interesting and important is the history of religious reform in France. Between 1520 and 1530, the period of Luther's greatest activity, both renaissance and reform found a firm footing in France, and so many circumstances seemed to favor the future of both that for a time it was doubtful with which side the victory would eventually lie. On the one side was the University of Paris, which throughout the Middle Ages had claimed for itself the right—denied to the Pope himself—of sovereign decree on the truth or falsity of all religious doctrine. As its decrees had in every case the strenuous support of the Parliament of Paris, the university was a formidable force to be reckoned with by every innovator in studies or religion. In 1519 Luther's dispute with Eck had been referred to the doctors of Paris for decision, and their judgment, delayed for two years, had been the unqualified censure of Luther's position. Thenceforward every advocate of the new religion, and they daily grew in numbers, especially among the middle class, both in Paris and in the provinces, was pursued by the fixed disapproval of the Parliament and the university. On the other hand, the king (Francis I.), eagerly encouraged by his famous sister, Margaret of Navarre, who herself had strong Protestant leanings, was at first disposed to use the new religious movement as a weapon to his hand in his dealings with the court of Rome. In the end Francis saw that separation from Rome meant the disruption of the French nation, and after 1534 he resolutely set himself to the extermination of every heretic in his dominions. His son and successor, Henry II. (1547–1559), carried out his policy with even greater rigor, but in spite of all efforts to suppress them the French Protestants grew into a body formidable alike by their position, wealth, and intelligence. The Huguenot wars, the massacre of St. Bartholomew (1572), and the Edict of Nantes (1598), are the outstanding events of this long struggle, which, involving political as well as religious questions of the first importance, threatened the very existence of France by suggesting to Philip II. the possibility of annexing the divided country as a province of Spain. By the edict of Nantes the French Protestants attained a certain measure of religious freedom; by its revocation in 1685 Protestantism was

stamped out of the country, and France thus deprived of the most divaricating elements in its society.

The religious revolution in Switzerland is second only to that of Germany in its direct influence on the subsequent fortunes of the European nations. In Switzerland we have the case of a double revolt from Rome springing from the same conditions, yet each having a character and an animating soul of its own. At Zurich, as early as 1519, and independently of Luther, Ulrich Zwingli, who, according to Ranke, combined in himself the best elements of renaissance and reform, gave rise to a movement which split the Swiss cantons into two hostile sections, and issued in the peace of Cappel (1531), which permitted to each canton the choice of its own form of faith. More important than the movement of Zwingli at Zurich is that associated with Calvin and Geneva. As in almost every other case of revolt, political considerations wrought with religious zeal in the breach of Geneva with Rome. Before 1530 the town had received the new religion from French refugees, who thus gave its peculiar character to the creed eventually associated with Calvin and Geneva. But it was in the successful effort of the town in throwing off the yoke of the Catholic Dukes of Savoy (1534) that it found itself forced to join the great Protestant schism, and to fashion a civil and religious polity compatible with an independent corporate life. It was in the accomplishment of this task that Calvin proved himself the great consolidator of the tendencies that underlay the Protestant movement. Inspired by Calvin, it was the pre-eminent destiny of Geneva at once to produce a reasoned civil and religious creed and a type of Christian believer that offered a solid front against the vast powers still at the command of the Roman see, and assured to Protestantism its own independent course in the history of mankind.

In 1532 the schism of England from Rome also became an accomplished fact. In this result had issued the negotiations of Henry VIII. with Pope Clement VII. for his divorce from Catharine of Aragon. But the view summed up in Gray's line, "And gospel light first dawned from Bullen's eyes," implies a totally inadequate recognition of the many forces that went to produce the English Reformation. The king's divorce was the mere occasion of what must sooner or later have been the only solution of England's relations with the papacy. In England all the forces, in greater or less degree, were at work which had produced the religious revolutions in Germany. As in Germany, the Church alike in its teaching and practice no longer represented the highest consciousness of the nation. It has of late been shown that its degradation was far from being so general or so complete as the official reports of Henry had seemed to prove; yet the state to which it had come was clearly such as to lend some countenance to the most drastic measure against it. By the end of the 15th century, also, the Renaissance, which was everywhere the solvent of tradition, had found its representatives in England. Linacre, Grocyn, Colet, and Sir Thomas More were all men more or less emancipated from mediævalism, though none of them broke communion with Rome. Both More and Colet spoke their minds freely on the unworthy lives of the clergy; and the latter by his foundation of St. Paul's School in 1510, and by his placing it under lay supervision, took a step of the highest importance in the direction of the new order. But it is in the political development of England that we find the adequate explanation of her final breach with Rome. For centuries the Pope had come to be more and more regarded as a foreign prince, whose powers, as he claimed the right to exercise them over Englishmen and English property, were incompatible with English interests and English liberty. When Clement VII., therefore, declared against the divorce from Catharine, Henry regarded the decision not as the oracle of Christendom, but as the counsel of an earthly prince whose own interests left him no other alternative.

The breach with Rome was thus inevitable. Henry himself to the close of his life professed to have broken with the old only in the one point of the headship of the Church. In the reign of Edward VI. a clear departure was made from the doctrinal system of the ancient Church; but the temporary reaction under Mary showed how strong a hold that system still possessed on the hearts of the people. When Elizabeth came to the throne in 1558 it was only her prudent policy that saved the country from the internecine divisions of France and Germany. Three parties were equally bent on realizing their own conceptions of a religious settlement. The adherents of the old religion, who still probably made a half of the people, had not lost hope of a return to the old spiritual allegiance. Those who had renounced the papacy themselves made two distinct parties, each bent on ends so conflicting, that it was evident from the first that they could never work in common. The governing principle of the one party, from which eventually sprang the Church of England, was to minimize

the differences between the old faith and the new, and as far as possible to maintain the continuity of the religious tradition in the country. The other, which drew its inspiration from Calvin and Geneva, and was afterward known as the Puritan party, aimed at a root and branch rejection of papal Christianity, as at once in the interest of what they thought a purer creed, and as the only safeguard against a return to the old constitution. It was owing to her politic handling of these conflicting parties that at Elizabeth's death England was of one mind regarding the question of the papal supremacy, and that the severance from Rome became a definitive fact in the development of the country. By happy turns of events, such as her excommunication by Pius V. in 1570, and by the extraordinary issue of the Spanish Armada in 1588, not only was the number of Catholics reduced, but such as still clung to the ancient faith thenceforward put their allegiance to their native prince before any claim of the Roman see. It was this final triumph of the Protestant revolution in England that saved the movement in all the other countries of Europe.

The triumph of the Protestant movement in Scotland is likewise a fact of the first importance in European history. In Scotland from the very beginning of Luther's revolt, we find the presence of the same elements which elsewhere led to revolution. As in other countries, the Scotch clergy had lost the respect of the country. As early as 1525 Lutheran books were so widely read that an act of Parliament was passed forbidding their importation. The very efforts of the Church to stamp out the new heresy, as in the burning of Patrick Hamilton in 1528, and of George Wishart in 1546, served only to hasten the turn of affairs which it had dreaded. Jealousy of the wealth and political influence of the clergy disposed the nobility to throw in their lot with the party of revolution. When in 1559 Knox returned from his long sojourn abroad, his unflinching zeal and personal force supplied the momentum that was needed to complete a revolution already in full course; and in the following year Protestantism was formally established as the religion of the country. The consequences of this revolution extended far beyond Scotland. Had Mary on her return in 1561 found Scotland united in the Catholic faith, she would have commanded the destinies of England. Elizabeth could never have effected a religious settlement, and, with England paralyzed, Protestantism could not have held its own against the united forces of Catholicism.

Thus, by the middle of the 16th century, it seemed as if the revolution must sweep all before it, and the papal system be as completely effaced by Protestantism as paganism had been effaced by Christianity. At the beginning of the revolt the authorities of the ancient Church did not fully realize that the forces arrayed against them menaced their very existence. When the true extent of the danger was realized the Church displayed all the resources of an institution whose roots were in the very heart of Christendom, and which, alike by its traditions and by its special adaptations to the wants of the human spirit, appealed to the deepest instincts of a large section of all the peoples of western Europe. The Society of Jesus, founded in 1540, supplied an army of enthusiasts, whose policy and devotion saved Rome from dissolution. By the decrees of the Council of Trent (1545–1563), inspired by the spirit and aims of the Jesuits, the Church reaffirmed its traditional teaching, conceding nothing either to renaissance or reform; and a succession of Popes during the later half of the 16th century carried out with the zeal worthy of the better ages of the papacy the policy marked out for them by the Jesuits. Through the disunion of the Protestants and the strenuous efforts of the papacy, the middle of the 16th century saw the tide of revolution checked; and in certain countries, more especially in Germany, the Jesuits even gained ground which had been lost. By the close of the same century Europe was portioned between the two religions almost by the same dividing lines as exist at the present day.

It has been said that the central fact of the religious revolution of the 16th century was the severance of the Protestant nations from the Roman see; but the great schism inevitably led to issues of which the Protestant reformers never dreamed, and which they would have denounced in as unqualified terms as any theologian of the mediæval Church. The reform of religion preached by Luther or Calvin implied no real change in the modes of thought that distinguished mediævalism. Their theology was but another form of scholasticism, their attitude to the classical tradition or to any departure from their own conception of the scheme of things was precisely that of the Schoolmen trained on the Decretals and Aristotle. For an infallible Church they substituted the Bible as the unerring expression of God's relation to man; the interpretation of the Bible they left to the individual consciousness. This freedom was of necessity only nominal, since the members of

any Protestant Church were members only on condition of their accepting the Church's interpretation of the contents of the Bible, and since each different Church deemed itself the special depositary of the only true conception of the perfect will of God. Nevertheless, it was from this attitude of the Protestant reformers to the Bible that the developments of modern thought sprang. A reformer like John Knox would have stamped out every form of thought hostile to his own synthesis of things divine and human; but it was not in the power of the Protestant system to do what had been so effectually done by the Church of the Middle Ages. In the mediæval conception Church and State made one organism; what menaced the life of the one menaced the life of the other. Hence the State was at the Church's bidding whenever its arm was needed to deal with any suggestion of heresy. But having no great central head, such an organic union was impossible for any Protestant Church, and religious error could not be regarded as a crime against the existing government. So complete was the revolution wrought by this changed relation of Church and State that toleration of different creeds, and not an iron uniformity, was in time seen to be the indispensable condition of civil society. But in this lies the fundamental distinction between mediævalism and the modern spirit. Mediævalism rested on the belief that society was threatened if any of its members questioned the body of truth of which the Church was the custodian; it is the distinctive principle of the modern spirit that truth shall be followed wherever facts are believed to lead.

REFORMATORY SCHOOLS, schools instituted for the training of juvenile offenders who have been convicted of an offense punishable by imprisonment. The first reformatory managed under legislative control was the one established in New York in 1824, known as the New York House of Refuge. Its success was so marked that similar institutions were established throughout the country. See JUVENILE COURTS.

REFORMED CHURCH, the name given first to the Helvetic Church, which rejected both transubstantiation and consubstantiation, regarding the communion as simply a commemorative ordinance. Afterward, the name Reformed Churches was extended to all other religious bodies who held similar sacramental views. The founder of the Helvetic Church was Ulrich Zwingli, who began to preach reformed doctrines in 1516. Between 1526 and 1532 the movement was communicated from Berne; it was at once German and French, and extended to the center of Switzerland from the gorges of the Jura to the deepest valleys of the Alps. In 1532 Geneva took the lead. Here the Reformation was essentially French. The first or German part of the movement was conducted by Zwingli, till his death at the battle of Cappel (Oct. 11, 1531), the second by various reformers, the third part by William Farel, and then by John Calvin.

REFORMED CHURCH, a religious body in the United States, whose designation has been changed from that of its progenitor, the Reformed Protestant Dutch Church, which arose in the Netherlands early in the 16th century and attained its form and organization during the struggle against Philip II. under the leadership of the princes of Orange. The Church was introduced into America early in that century. Public worship was commenced at New Amsterdam in 1643. After the surrender of New Amsterdam to the English in 1664 the growth of the Church was slow. The Dutch language was used exclusively in worship down to 1763. About the middle of the 18th century arose the noted *coetus* and *conferentie* controversy, which turned on the question of dependence of the Church of Holland. An independent Church organization was effected in 1771. From 1817 to 1857 the Reformed Church co-operated with other bodies in supporting foreign missions; and from 1836 with the American Board. In 1857 an amicable separation from the latter was effected, and the missions of Amoy and Arcot were transferred to the Reformed Church. The doctrinal standards of the Church are: (1) the Belgic confession of faith; (2) the Heidelberg catechism; (3) the canons of the Synod of Dort. The synod of 1874 adopted a revised liturgy, the use of which is optional. The government of the Church is according to the Genevan model. The officers are ministers, elders, and deacons, who compose the consistory, to which the government of the individual church belongs. The classis, consisting of the ministers within a certain district and one elder delegated from each church, corresponds to the presbytery in the Presbyterian Church. The particular synods, of which there are four, New York, Albany, New Brunswick, and Chicago, are delegated bodies composed of four ministers and four elders from each classis within the bounds of each synod. These are courts of appeal from the decisions of the classis. The general synod is the highest court of appeal, and exercises a general supervisory power over

the Church. It is composed of three ministers and three elders from each classis. In 1867 the word "Dutch" was dropped from the corporate name of the body. "The Christian Intelligencer," a weekly journal devoted to the interests of the Church, was established in New York, 1828. There are two theological seminaries, one at New Brunswick, N. J., the other in connection with Hope College, at Holland, Mich. Statistics, 1919: Churches, 708; ministers, 756; members, 144,166.

REFORMED CHURCH IN THE UNITED STATES, formerly German Reformed Church in the United States of America, an off-shoot of the Reformed Church of Germany. The first minister was the Rev. George Michael Weiss, who emigrated with about 400 people of the Palatinate in 1727, and settled in Pennsylvania, E. of the Susquehanna. In 1746 the Rev. Michael Schlatter was commissioned by the synods of north and south Holland to visit their German missions in America, and regulate their relations. He assembled in Philadelphia the first synod or *coetus* of the German Reformed Church, 1747. The German Reformed *coetus* continued under the jurisdiction of the Church of Holland till 1793, when an independent synod was formed. It increased rapidly in membership and congregations. The first triennial general synod, with jurisdiction over the whole Church, met in Pittsburgh, 1863. The general synod of 1869 resolved to drop the word "German" from the title of the Church. The Heidelberg catechism is the only standard of doctrine. The worship of the Church is liturgical; its government is presbyterian. Reception into the full communion of the Church takes place by the rite of confirmation. Christmas, Good Friday, Easter, and Whitsunday are observed with much solemnity. Eleven English and five German papers are published in the interest of the Church; and there are 16 theological and literary institutions under its control. Statistics, 1919: Churches, 1,731; ministers, 1,242; members, 340,671.

REFORMED EPISCOPAL CHURCH, a denomination organized by members of the Protestant Episcopal Church, who give substantially the following statement of the events and circumstances which, as they believe, justify their course: (1) The Protestant Reformation in England had outwardly a political origin (in the act of the king, Henry VIII., renouncing allegiance to the Pope, and proclaiming himself head of the English Church), by which the work was biased and cut short. During the brief life of the young king, Edward VI., the regent, or protector, being in favor of the Reformation, great progress in it was made. Under Mary the supremacy of the Pope was again acknowledged. When Elizabeth became queen, wishing to harmonize her divided subjects, and hoping for reconciliation with Rome, she strove to have the liturgy framed so as to satisfy both parties. Consequently it contained contradictory elements. At a later period, when she had found her hope futile, the articles of faith adopted were decidedly Protestant. Thus it came to pass that in the Church of England two parties found support in her ritual; the one Protestant, the other having an affinity with Rome. (2) After the American Revolution, when the Church of England in the colonies became the Protestant Episcopal Church of the United States, the Book of Common Prayer, having been adopted without material alterations, retained its conflicting elements. (3) The Tractarian movement, which began at Oxford, 1833, was a successful endeavor to revive the principles of antiquity and Catholicity contained in the prayer book, in opposition to its Protestant elements. It discarded Protestant principles and taught the doctrines of apostolic succession, priestly absolution, baptismal regeneration, the real presence, and the authority of the Church. (4) These teachings produced a powerful effect in the United States also. A great increase in ritualism, and of the drift toward Rome, was soon manifested; the opposition between the "High" and the "Low Church" parties was intensified, and practical measures were adopted by each which widened the chasm. (5) Several subsequent public events fanned the flame of discontent, especially the censure of one clergyman for preaching in a Methodist Church, and the suspension of another for omitting the word "regenerate" in the baptismal office. (6) Remonstrances and petitions for relief, which were numerously and urgently presented to the General Convention, produced no effect. (7) During the sessions of the Evangelical Alliance in New York in October, 1873, Bishop Cummins of the diocese of Kentucky, having, by invitation, officiated at a union celebration of the Lord's Supper, in company with representatives of other denominations, was for this act of Christian fellowship bitterly censured through the press by members of the "High Church" party. After this, convinced that he could no longer rightfully continue in a church whose theory and practice (as interpreted by the majority of its mem-

bers) denied the brotherhood of believers in Christ, Bishop Cummins withdrew from the ministry of the Protestant Episcopal Church. (8) This led to the organization, Dec. 2, 1873, of the Reformed Episcopal Church, of which Bishop Cummins and the Rev. Dr. Charles E. Cheney were elected bishops. At the same time the following declaration of principles was adopted: I. The Reformed Episcopal Church "holding the faith once delivered to the saints" declares its belief in the Holy Scriptures of the Old and New Testaments as the Word of God, and the sole rule of faith and practice; in the creed "commonly called the Apostles' Creed"; in the divine institution of the sacraments of baptism and the Lord's Supper; and in the doctrines of grace substantially as they are set forth in the Thirty-nine Articles of Religion. II. This Church, recognizes and adheres to Episcopacy, not as of divine right, but as a very ancient and desirable form of Church polity. III. This Church, retaining a liturgy which shall not be imperative or repressive of freedom in prayer, accepts the Book of Common Prayer, as it was revised, proposed, and recommended for use by the General Convention of the Protestant Church, 1785; reserving full liberty to alter, abridge, enlarge, and amend the same as may seem most conducive to the edification of the people, "provided that the substance of the faith be kept entire." IV. This Church condemns and rejects the following erroneous and strange doctrines as contrary to God's word: (1) That the Church of Christ exists only in one order or form of ecclesiastical policy. (2) That Christian ministers are "priests" in another sense than that in which all believers are "a royal priesthood." (3) That the Lord's table is an altar on which the oblation of the body and blood of Christ is offered anew to the Father. (4) That the presence of Christ in the Lord's Supper is a presence in the elements of bread and wine. (5) That regeneration is inseparably connected with baptism. To this statement it may be added that in this Church the bishops do not constitute a separate order, but are presbyters; in council they vote with and as their brother presbyters, and are subject to confirmation or appointment by the general council. In 1919 the denominations had in the United States and Canada 11,217 communicants.

REFORMED PRESBYTERIAN CHURCH, or CAMERONIANS, a body of Christians who profess to hold the principles of the Church of Scotland at the period of the second Reformation between 1638 and 1650. They claim to be the legitimate successors of that section of the Covenanters which was headed by Cameron and Cargill, who considered that Charles II. had forfeited all title to their allegiance, having broken the solemn vows which he made at his coronation. When William of Orange was called to the throne in 1688 they were among the first to welcome him; but while they avowed their readiness to yield all loyal obedience and submission they openly declared their dissatisfaction with the Revolution settlement. In 1690 Presbyterianism was established in Scotland, but because the state claimed a certain control over the Church this settlement was also repudiated by the Reformed Presbyterians. The position which the sect was thus compelled to occupy was that of dissenters from the Church and protesters against the state. For upward of 16 years after they had publicly avowed their principles they remained in an unorganized condition and without a regular ministry. The first who exercised this office was the Rev. John McMillan, who in 1706 demitted his charge as parish minister of Balmaghie, and in 1743 he met with a coadjutor in the Rev. Thomas Nairne, whereupon these two constituted a Reformed presbytery in 1743. In 1810 three presbyteries were formed, and in 1811 a synod was constituted. The number of presbyteries was afterward increased to six, and the number of ministers rose to about 40. In 1876 a large portion of them united with the Free Church of Scotland. The Reformed Presbyterians in the United States in 1919 had about 10,000 members.

REFRACTION. When a beam of light traveling in a transparent medium, impinges obliquely upon the surface of another transparent medium, what occurs in the vast majority of cases is that a part of it is reflected (see REFLECTION) and a part of it enters the second medium, but in so doing is "refracted" or bent out of its former course. If, for example, the light travel in air and impinge obliquely on glass, the course of the refracted portion is bent so that the refracted light travels more directly or less obliquely through the glass; and, conversely, if the light travel in glass and impinge on an air surface, the portion which is refracted into the air will travel through the air more obliquely with respect to the refracting surface than the original light had approached it. The law of refraction was discovered by Snell in 1621, and is the following: The refracted ray is in the same plane with the incident and the reflected

ray, and is therefore in the "plane of incidence," and the sine of the angle of incidence bears to the sine of the angle of refraction a ratio which remains constant, for any two media, whatever be the angle of incidence.

The observed fact that light is differently bent in its course by different refracting media shows that there is a difference between bodies in their power of receiving light through their bounding surface. Newton, in accordance with his corpuscular theory, interpreted this as showing that when the luminous corpuscles come very near the surface of a denser substance they are as it were jerked or made to swerve out of an oblique path and hurried in by the attraction of the denser substance so as to enter that substance more directly; and that when the light quits the denser substance it is retarded by a similar attraction. The consequence of this would be that light would travel in the denser medium perhaps not appreciably faster than in air, but with a mean velocity certainly not less. On the undulatory theory, however, refraction is a necessary consequence of a slower travel of ether-disturbances in the denser medium.

When a spherical wave impinges on a plane surface it is modified into a hyperboloid, the center of curvature of the central portion of which is farther away than or nearer than the center of the sphere in the ratio of the refractive index of the second medium to that of the first. An eye within a rarer medium will thus see the image of a point situated within the denser medium as if it were nearer than it really is; hence a stick appears bent when partly immersed obliquely in water; and, owing to differences in the amount of refraction at different angles, the bottom of a tank looked down upon appears sunk in the middle.

Why ether disturbances of differing wave lengths are differently refracted in such a medium as glass is not yet perfectly clear. The fact that ether disturbances of greater frequencies are propagated more slowly through optically denser matter may be fairly inferred to arise from a mutual interaction of the ether, periodically stressed and released, and the matter amid whose molecules the disturbance is propagated. The question is complicated by the downright absorption or non-transmission of many particular wave lengths, and by the peculiar behavior of some particular transparent substances which produce "anomalous dispersion"; for example, iodine vapor refracts red light more than blue, and blue more than violet; and fuchsine refracts blue and violet light less than it does red, orange, and yellow, while it absorbs the rest. Further, it is found that in these cases of anomalous dispersion the substance generally has in the solid form a surface color different from that seen through its solution; and there are always absorption bands, on the red side of which the refrangibility is increased, while on the other side it is diminished, as if the molecules themselves took up oscillations of particular periods and hurried on the propagation of slightly slower or retarded that of slightly more rapid oscillations of the ether. It appears as if this kind of action were never wholly absent; the spectrum produced by a prism never wholly coincides with the diffraction spectrum in which the deviation for each wave length depends directly on the wave length itself; and the spectrum produced by a prism say of crown glass does not exactly coincide in its visible distribution of colors with a spectrum of equal length made by a flint-glass prism. This is called the "irrationality of dispersion." If we take two prisms, one of crown, the other of flint-glass and pass a beam of light through; then, if the angles of these prisms be suitable, the rays dispersed by the one will be collected by the other, and there will on the whole be deviation without dispersion; but not absolutely so, on account of the irrationality of dispersion of both prisms, the effect of which is that a calculated ratio of angles and refractive indices which will cause deviation without dispersion for any given pair of wave lengths will, to a very slight extent in most cases, fail to do so for the other wave lengths present in the mixed light transmitted through the system. By the use of three prisms three wave lengths may similarly be achromatized.

Double Refraction.—The wave surface developed when a disturbance originates at a point in a homogeneous medium, like glass, is spherical in form. In uniaxial crystals the disturbance travels with two wave fronts, one spherical, the other ellipsoidal; and the two wave fronts are coincident along the direction of the optic axis. Of such crystals some are "positive," such as quartz and ice, and in these the sphere incloses the ellipsoid; in "negative" crystals, such as Iceland spar and tourmaline, the ellipsoid incloses the sphere. In biaxial crystals the three optical axes are dissimilar, and the wave surfaces become complex; there are two refracted rays. If a doubly refracting substance be put between two crossed Nicol's prisms light passes; and by this means it is found

that many substances ordinarily not double refracting become so when exposed to unequal stress, as by pressure, heat, or rapid cooling.

Conical Refraction.—In certain cases light, passing as a single ray through a plate of a biaxial crystallized body, emerges as a hollow cone of rays; and in others a single ray, falling on the plate, becomes a cone inside the crystal, and emerges as a hollow cylinder. These extraordinary appearances were predicted from the wave theory of light by Sir W. R. Hamilton, and experimentally realized by Lloyd. See Preston's "Theory of Light" (1890).

REFRIGERATION. In refrigerating machines there is a transference of heat from the substance which is to be refrigerated to the cooling agent, which is evaporating fluid, expanding gas, or a material which promotes evaporation of the liquid to be cooled. If 80.025 pound-Centigrade units of heat be withdrawn from a pound of water at 0° C. it will become a pound of ice of the same temperature. If this heat be withdrawn from the water by an evaporating liquid there are two conditions which must be fulfilled; the evaporating liquid must evaporate very rapidly, and the latent heat of evaporation (*i. e.*, the heat absorbed from outside during evaporation) must be as great as possible. Ether boils at 35.5° C. (95.9° F.), and has at 0° C. (32° F.) a vapor-pressure of 18.4 cm. (7.36 inches) of mercury; at 0° C. it requires 94-pound-Centigrade units of heat to evaporate a pound of it; and at that temperature its evaporation ought accordingly to be able, if the whole of the heat required for evaporation were withdrawn from water, to free 94 ÷ 80.025 times its weight of water at 0° C., so that a ton of ice (2,240 pounds) would be produced by the evaporation at 0° C. of a minimum of 1,907 pounds of ether. Liquid ammonia boils at —35° C. (—31° F.), and has at 0° C. a vapor-pressure of 318 cm. (127.2 inches), or more than four atmospheres; it is thus extremely rapidly volatilized at 0° C.; and, as its latent heat of evaporation is as much as 294, the production of a ton of ice would thus only demand the evaporation of a minimum of 610 pounds of liquid ammonia. Machines for using ether have been constructed by Siebe, Duvallon, Lloyd, Mühl and others. The ether is caused to evaporate rapidly by an air pump or pumps worked by steam; it cools brine or a solution of calcium chloride, and this cools the water to be frozen or the air to be refrigerated; the ether vapor is condensed by pressure and cold and used over again. Ammonia was first used by Carré in 1860; ammonia gas driven off by heat from its solution in water is condensed in a cooled vessel under its own pressure; the original ammonia vessel is now cooled, and the liquid ammonia rapidly evaporates (its vapor being absorbed), chilling its surroundings. Anhydrous liquid ammonia has been used by Reece and others.

The Bell-Coleman apparatus, greatly employed for producing cold dry air for use in the refrigerating chambers of dead-meat-carrying steamers, the principle is that compressed and cooled air will, when allowed to expand against an external resistance, so that it does mechanical work during expansion, lose heat equivalent to the energy which it has expended.

Porous jars, used to keep water cool, are among the simplest kinds of refrigerating apparatus; the evaporation at the outer surface of the jar of the water passing through the porous earthenware taking latent heat from the water.

REFRIGERATOR, that which refrigerates, cools, or allays heat. Specifically applied to: Brewing: An apparatus consisting of a shallow vat traversed by a continuous pipe, through which a stream of cold water passes. Steam: (1) The casing with connecting tubes, through which feed-water passes on its way to the boiler, and is warmed by the current of hot brine passing in the other direction, on the outside of the tubes. The hot brine, at a temperature of say 218° F., is that which has been removed from the boiler by the brine pump. (2) A form of condenser, in which the injection water (fresh) is cooled by a surface application of cold sea water. A chest or closet holding a supply of ice to cool provisions and keep them from spoiling in warm weather.

REFUGE, that which shelters or protects from danger, distress, or calamity; a sanctuary; a place to flee to in time of danger. Specifically, an institution for affording temporary shelter to the destitute or the homeless; a house of refuge.

REFUGE, CITIES OF, in Jewish law and history, six Levitical cities divinely appointed as places of refuge to one who had committed manslaughter, and was pursued by the "Revenger" or "Avenger" of Blood. Three (Kedesh Naphtali, Schechem, and Hebron) were W. of the Jordan, and three (Bezer in Reuben, Ramoth Gilead in Gad, and Golan in the half-tribe of Manasseh, were E. of that river.

REFUGEE, a word that probably came into existence when the Protestants under Louis XIV. escaped from their oppressors to other lands. It is applied also to one who takes refuge; one who flees to a place of refuge or shelter, and to one who flies for refuge in time of persecution or political commotion to a foreign country.

RĒGĀLECUS, the deal-fish; a genus of acanthopterygian fishes; division Tæniiformes. Each ventral fin is reduced to a long filament, dilated at the extremity, somewhat like the blade of an oar, whence they have been called oar fishes. Range wide; they have been taken in the Mediterranean, the Atlantic and Indian Oceans, and on the coast of New Zealand.

REGELATION, the union, by freezing together, of two pieces of ice, with moist surfaces when placed in contact at a temperature of 32°. A snowball is formed by the regelation of the particles composing it, so are the snow bridges spanning chasms on high mountains. See GLACIER.

REGENERATION, in biology, the genesis or production of new tissue to supply the place of an old texture lost or removed. In some of the inferior animals an organ or a limb can thus be supplied; in man regeneration is much more limited in its operation. Thus, when a breach of continuity takes place in a muscle, it is repaired by a new growth of connective tissue, but muscular substance like that lost is not restored. Nerve, fibrous, areolar, and epithelial tissues are more easily repaired. In Scripture, regeneration is the state of being born again, *i. e.*, in a spiritual manner. The word regeneration (Greek *palingenesia*) occurs twice in the Authorized Version and Revised Version of the New Testament. In Matt. xix: 28, if connected, as seems natural, with the words which follow, not with those which precede it, it refers to the renovation or restoration of all things which shall take place at the second advent of Christ. The other passage is:

"Not by works done in righteousness which we did ourselves, but according to his mercy he saved us through the washing [margin, laver] of regeneration and renewing of the Holy Ghost."—Titus iii: 5 (R. V.).

The doctrine of regeneration was formally expounded by Jesus in his interview with Nicodemus (John iii: 1–10). All theologians consider the Holy Spirit the author of regeneration. Two views exist as to the relation between baptism and the new birth. One considers the water in John iii: 5, and the washing or laver of Titus iii: 5, to be that of baptism, and that the administration of the rite of baptism is immediately followed or accompanied by what is called in consequence "baptismal regeneration." The other view is that the water, washing and laver, in these passages, are but figurative allusions to the power of the Holy Spirit in removing the corruption of the heart, and that regeneration is effected, quite independently of baptism, by the Holy Spirit alone.

REGENSBURG. See RATISBON.

REGENT, one invested with vicarious authority, one who governs a kingdom during the minority, absence, or disability of the sovereign. In hereditary governments the regent is usually, but not necessarily or always, the nearest relative who is capable of undertaking the office. Also a member of a governing board; a trustee; as the Regents of the Smithsonian Institution at Washington, etc. Also a member of one of the English universities, having certain duties of instruction or government. At Cambridge the regents are all resident masters of less than four years' standing, and all doctors of less than two years standing. At Oxford the period of regency is shorter. Masters and doctors of a longer standing, who keep their names on the college books are termed non-regents. At Oxford the regents compose the congregation, by whom degrees are conferred, and the ordinary business of the university transacted. Together with the non-regents they compose convocation. At Cambridge the regents compose the upper, and the non-regents the lower house of the senate or governing body.

REGENT BIRD, the *Sericulus chrysocephalus*, a bower bird of beautiful plumage. In the adult male it is golden yellow and rich velvet black; the female is of more sober hue, all the upper surface being deep olive brown. The normal number of eggs is apparently two, that number of young birds having been repeatedly found. It is sometimes, but erroneously, called the regent oriole.

REGGIO (Reggio di Calabria), a seaport and province of south Italy; on the Strait of Messina; 9 miles S. E. of the city of Messina. It is the seat of an archbishop, and has a fine cathedral. Manufactures of silks, perfumes, gloves, stockings, and caps—the last three made from the byssus of the PINNA (*q. v.*)—fruits, wine, and olives are cultivated, and fishing is carried on. Pop. province, about 475,000; city, about 45,000. The ancient Rhegium was founded by Greeks 8th century B. C. It was taken and de-

stroyed by Dionysius of Syracuse (387 B. C.), the Romans (270), Alaric (A. D. 410), Totila (549), the Saracens (918), and captured by Robert Guiscard (1060), Pedro of Aragon (1282), and the Garibaldians (1860). In 1783 and 1908 it was ruined by an earthquake.

REGGIO (Reggio nell' Emilia), a city and province of central Italy; on the ancient *Via Emilia* (Emilian Road); 17 miles S. E. of Parma; still surrounded with walls. It has a good cathedral of the 15th century, a natural history and an antiquarian museum, etc. There are manufactures of silk, hemp, turnery, leather, etc., and carry on considerable trade, especially in timber. Reggio is the birthplace of Ariosto. During the later Middle Ages it was an independent city, but was subject to the D'Estes from 1409 onward. The bishopric was founded in 450. Pop. province, about 330,000; city, about 75,000.

REGICIDES, the men who were appointed on the Parliamentary committee to try King Charles I., but in a narrower sense the men, 67 in number, who actually sat in trial on him. Of these only 59 signed the death warrant. After the Restoration the regicides were brought to trial on a charge of high treason. Twenty-nine were condemned to death, but only 10 were executed, 19, together with six others who were not tried, being imprisoned, most of them for life. More than 20 who were already dead were tried and condemned, notwithstanding, and Cromwell, Ireton, and Bradshaw, three of them, were exhumed and hanged at Tyburn, and then reburied at the foot of the scaffold. For regicides in a wider use of the term, see ASSASSINATION.

REGILLUS, LAKE, a body of water which lay in Latium, to the S. E. of Rome, probably near the modern Frascati; it is celebrated in the semi-legendary history of Rome as the scene (496 B. C.) of a great battle between the Romans and the Latins, fighting on behalf of the banished Tarquins, in which the latter were entirely defeated.

REGINA, city and capital of the Province of Saskatchewan; formerly capital of the Northwest Territories, Canada; on the Canadian Pacific, Canadian National, and Grand Trunk Pacific railroads, 356 miles W. of Winnipeg. Here are the government buildings and the headquarters of the Mounted Police and of the Indian Department. The town contains churches representing the Anglican, Baptist, Methodist, Presbyterian, and Roman Catholic bodies. It is steadily growing in importance as a manufacturing and trade center. Louis Riel, the half-breed insurgent, was executed here in 1885.

Regina nobly responded to the call for troops in 1914—sending 4 battalions as fighting units to the front and thousands as re-enforcements. Pop. about 40,000.

REGIOMONTANUS, a German astronomer, whose real name was Johann Müller; born in Königsberg (in Latin Regiomontum, whence came his name), in Franconia, June 6, 1436. He was educated at Leipsic; studied mathematics at Vienna; accompanied Cardinal Bessarion to Rome, where Beza gave him further instructions in Greek literature, which enabled him to complete a new abridgment in Latin of the Almagest of Ptolemy. In 1471 he built an observatory at Nuremberg, but he returned to Rome on the invitation of Sixtus IV., who employed him in the reformation of the calendar. His "Kalendarium Novum" (New Calendar) is believed to be the first almanac issued in Europe. He died July 6, 1476.

REGISTER, a device for automatically indicating the number of revolutions made or amount of work done by machinery; or recording steam, air, or water pressure, or other data, by means of apparatus deriving motion from the object or objects whose force, distance, velocity, direction, elevation, or numerical amount it is desired to ascertain. There are various special appliances of this kind, each particularly adapted for the peculiar operation which is to be investigated; many depending on the action of clock-work mechanism, others, as in registering meteorological instruments, having means for recording varying conditions, as with the anemometer, barograph, etc. In music, the compass of a voice or instrument, or a portion of the compass of a voice; as, the upper, middle, or lower register. Also, an organ stop, or the knob or handle by means of which the performer commands any given stop. In printing, the agreement of two printed forms to be applied to the same sheet, either on the same or the respective sides thereof. The former is used in chromatic printing, where a number of colors are laid on consecutively.

REGISTRATION, a modern social or civil system pertaining to births, marriages, and deaths, variously regulated in different countries. In England, parish registers of baptisms, marriages, and burials were instituted by Lord Cromwell while he was vicar-general to Henry VIII., and subsequently regulated by various acts of Parliament. No thorough system, however, existed till in

1836 a Registration Act was passed applicable to England and Wales, which has been amended by subsequent acts. In the United States, there is no national law on the subject, such regulations being made by States, municipalities, or religious bodies.

REGNAL YEARS, the years a sovereign has reigned, numbered successively, and used for chronological purposes, as in the enumeration of acts of Parliament. The practice of dating a new reign from the day following the last of the late king's reign has generally been adopted since the reign of Richard II., but before this time a reign was generally considered to begin with some act of sovereignty.

REGNAULT, ALEXANDRE GEORGES HENRI, a French painter; born in Paris, Oct. 30, 1843, the son of HENRI VICTOR REGNAULT (*q. v.*). His aptitude for drawing manifested itself very early, and he was continually sketching the animals in the Jardin des Plantes. He studied art under Lamothe and Cabanel; and, after two unsuccessful attempts, gained the prix de Rome (the Rome prize) in 1866. He executed there a remarkable portrait of Madame Duparc, and his historical subject of "Automedon Breaking the Horses of Achilles," and drew on wood illustrations for Way's "Rome." In 1869 he painted an equestrian portrait of General Prim, now in the Louvre, and in 1870 "The Execution Without Judgment Under the Moorish Kings of Granada" to be found in the same collection. Other works of 1870 are "Judith" and "Salome." He returned to Paris on the outbreak of the Franco-Prussian War; and though exempt from military service, he volunteered as a private soldier, and was killed at Buzenval, Jan. 19, 1871.

REGNAULT, HENRI VICTOR, a French scientist; born in Aix-la-Chapelle, Prussia, July 21, 1810. A shopman in a Paris bazaar, he entered the Polytechnic School, and, after the two years' course, came out as a mining engineer. He became a professor in Lyons, whence, in 1840, he was recalled to Paris as a member of the Academy of Sciences, in consequence of some important discoveries in organic chemistry. He filled chairs in the Polytechnic School and the College of France, and became in 1854 director of the imperial porcelain manufactory of Sèvres. He devoted himself to the determination of important physical data, the Royal Society of London awarded him their Rumford medal and the Copley medal (1869). He published an "Elementary Course in Chemistry" (1871). He died Jan. 20, 1878.

REGULAR CLERGY, the term applied in the Roman Catholic Church to priests who have taken the vows, and who are bound to follow the rules of some monastic order, as opposed to the secular clergy, that is parish priests, etc., not connected with any of the orders.

REGULUS, a term in metallurgy, now used in a generic sense for metals in different stages of purity, but which still retain, to a greater or less extent, the impurities they contained in the state of ore.

REGULUS, the star Alpha Leonis, the brightest in the constellation of the Lion.

REGULUS, MARCUS ATTILIUS, a Roman general, celebrated for his patriotism and devotion in the service of his country. Made consul a second time about 256 B. C., with his colleague, Manlius Vulso, he commanded in the first war against Carthage. Taken prisoner by the Carthaginians, he was sent to Rome with an embassy, that peace might be procured, and bound himself, by an oath, to return if the terms were rejected. He considered it his duty to advise the continuance of the war; which, being determined on, no entreaties could prevent him from fulfilling his solemn engagement; and the Carthaginians, on his return, put him to a cruel death.

REGULUS, or **RULE, ST.**, according to legend, a monk of Constantinople or Bishop of Patras, who in A. D. 347, came to Muckross or Kilrimont (afterward St. Andrews), bringing relics of St. Andrew to Scotland from the East.

REGURGITATION, the flowing back into the vessels of the heart of the blood which had just left them. It is the result of valvular disease of the heart. It is of three kinds: aortal, mitral, and tricuspid regurgitation.

REHAN (originally CREHAN), **ADA**, an American actress; born in Limerick, Ireland, April 22, 1860. In 1865 she came with her parents to the United States. She first appeared on the stage in Newark, N. J., when 14 years old. In 1879 she joined Augustin Daly's company. She frequently played before London audiences, and also in France and in Germany. Miss Rehan created over 40 rôles in comedy. Among her best known personations are Katherine, in "The Taming of the Shrew"; Rosalind, in "As You Like It"; Viola, in "Twelfth Night"; Maid Marian, in "The Foresters"; etc. She only acted occasionally after 1889. Died 1916.

REICHENBERG, the chief seat of the cloth manufacture in north Bohemia; on the Neisse river; 52 miles N. E. of Prague. Some 10,000 workmen are employed; cotton and woolen fabrics, machinery, and leather are manufactured. The cloth industry was estabilised here in the 16th century. Pop. about 40,000.

REICHSRATH, the representative council of the former Empire of Austria. See AUSTRIA.

REICHSTADT, NAPOLEON FRANCOIS CHARLES JOSEPH, DUKE DE. See NAPOLEON II.

REICHSTAG, under the empire, the representative legislative body of the German nation as a whole, as the Bundesrath was of the separate German states. The president of the Reichstag was elected by the deputies. See GERMANY.

REID, GEORGE, a Scotch artist; born in Aberdeen, Scotland, Oct. 31, 1841. After having been trained as a lithographer, he studied art in Edinburgh, Utrecht, Paris, and The Hague. In 1891 he became president of the Royal Scottish Academy. He is most widely known by his portraits. He was also noted as a flower and landscape painter and a book illustrator. Died 1913.

REID, SIR GEORGE HOUSTOUN, an Australian political leader, born in Scotland in 1845 and died in Australia in 1918. In 1852 his family emigrated to Australia and he entered the government service there when he was nineteen years old. In 1880, after having served in the colonial legislature of New South Wales, he was appointed minister of instruction, a position he occupied but a few months. From 1894 to 1899 he was premier of New South Wales, and later when the Commonwealth was formed became prime minister, championing the cause of free trade. Defeated in 1905, he continued to lead his party for three years afterward, when he retired from active politics.

REID, MAYNE, a British novelist; born in north Ireland, in 1818. His love of adventure took him to Mexico and then to the United States, where he traveled extensively as hunter or trader; he joined the United States army in 1845 and fought in the Mexican War. He afterward returned to London, where he became well known as a writer of thrilling juvenile stories. Among the number are the "Rifle Rangers," "Scalp Hunters," the "War Trail," the "Headless Horseman," the "White Chief," etc. He died near London, Oct. 22, 1883.

REID, OGDEN MILLS, an American newspaper editor and owner, son of Whitelaw Reid. Born in New York in 1882 he graduated from Yale University in 1904 and then went to Bonn University, Germany. In 1908 he was admitted to the bar, but soon afterward joined the editorial staff of the New York "Tribune." In 1913 he succeeded his father as editor of the paper.

REID, THOMAS, a Scotch philosopher; born in Strachan, Scotland, April 26, 1710. He was educated at Marischal College, Aberdeen, and in 1737 was presented to the living of New Machar in Aberdeenshire. His first philosophical work was an "Essay on Quantity" (1748). In 1752 the professors of King's College, Aberdeen, elected Reid Professor of Moral Philosophy in that college; and in 1764 he published his well-known work, "An Inquiry Into the Human Mind on the Principles of Common Sense." The same year he succeeded Adam Smith as Professor of Moral Philosophy in Glasgow University, a position which he occupied till 1781. His other writings are "Essays on the Intellectual Powers of Man," and "Essays on the Active Powers of the Human Mind." His philosophy was directed against the principles and inferences of Berkeley and Hume, to which he opposed the doctrine of common sense. He died Oct. 7, 1796.

REID, SIR WEMYSS, an English journalist; born in Newcastle-on-Tyne, in 1842. He contributed largely to English reviews and magazines, and published: "Cabinet Portraits: Sketches of Leading Statesmen of Both Parties" (1872); "Charlotte Brontë: A Monograph" (1877); "Politicians of Today" (1879); "A Memoir of John Deakin Heaton" (1883); "Gladys Fane: A Story of Two Lives" (1883); "Mauleverer's Millions" (1885); "Life of William Edward Forster" (1888). He was editor of the "Speaker" from its foundation till 1899. He was knighted in 1894, and died in 1905.

REID, WHITELAW, an American editor; born in Xenia, O., Oct. 27, 1837. He was graduated at Miami University in 1856; was on the editorial staff of several leading Ohio papers; in 1869 became managing editor of the New York "Tribune," and, after 1872, editor-in-chief and in financial control. He twice declined appointment as minister to Germany; and was minister to France in 1889–1892, where he negotiated valuable reciprocity treaties. In 1892 he was the unsuccessful Republican candidate for Vice-President. He represented the

United States as special ambassador at Queen Victoria's jubilee in 1897; member of the American-Spanish Peace Commission in 1898; special ambassador of the United States at the coronation of King Edward VII. in 1902, and ambassador 1905-1912. He is author of: "Ohio in the War" (1868); "Schools of Journalism" (1871); "The Scholar in Politics" (1873); "Some Consequences of the Last Treaty of Paris" (1899); "Our New Duties" and "Later Aspects of Our New Duties" (1899); "Our New Interests" (1900); "Problems of Expansion" (1900). Died in 1912.

REIGATE, a thriving market-town of Surrey, England; 21 miles S. of London. Of the castle of the Earls of Warrenne little remains save a grassy mound. The church contains the grave of Lord Howard of Effingham, and a library (1701) with some curious MSS. and many of Evelyn's books. Foxe, the martyrologist, lived here, and here Archbishop Usher died. Pop. about 30,000.

REIGN OF TERROR, a period of the French Revolution, conspicuous for its horrors and cruelties. It is generally considered to extend from Jan. 21, 1793, the date of the execution of Louis XIV., to July 28, 1794, when Robespierre and other sanguinary leaders were guillotined on the spot where their victims had been killed.

REIMS. See RHEIMS.

REINACH, JOSEPH, a French statesman and journalist. Born in 1856, he was educated at the University of Paris and admitted to the bar in 1877. From 1881-1882 he was private secretary to Gambetta. In 1886 he became part owner of a newspaper called "République Française." Three years later he was chosen as a Liberal-Republican member of the House of Deputies. He took a great interest in the defense of Dreyfus and has published an authoritative history of the case. So bitterly did he wage war in behalf of his republican ideas that he was at one time expelled from his captaincy in the army and deprived of the Legion of Honor.

REINDEER, the *Rangifer tarandus*, the only domesticated species of the family. It extends over the boreal regions of both hemispheres, and runs into several well marked varieties. Many authors consider the American reindeer or caribou, which has never been domesticated, as a distinct species. The reindeer formerly had a much wider geographical range, and is probably the *bos cervi figura* described by Cæsar as inhabiting the Hercynian forests, probably when the European winters were much severer than now. Both the male and female have antlers, and these are not alike on both sides, the great palmated brow antler being, as a rule, developed on one side only. In the winter the fur is long, grayish brown on the body; neck, hind-quarters, and belly white. In summer the gray hair darkens into a sooty brown, and the white parts become gray. To the Laplander the reindeer is the only representative of wealth, and it serves him as a substitute for the horse, the cow, the sheep, and the goat. It is extensively employed as a beast of draught and carriage, being broken to draw sledges, or to carry men or packages on its back. A

REINDEER

full-grown animal can draw a weight of 300 pounds, and travel at the rate of 100 miles a day, its broad deeply cleft hoofs fitting it admirably for traveling over the broken snow. In winter the herds feed in the woods on the lichens which hang from the trees; in summer they seek the mountains in order to escape the mosquitoes and gad-flies. In 1891 domestic reindeer were introduced into Alaska by Dr. Sheldon Jackson for the benefit of the natives who frequently suffered for food, and for purposes of transportation. In 1898 Dr. Jackson, as agent of the United States Government, procured a colony of Laplanders to train the natives in the care of the reindeer.

REINDEER MOSS, a lichen, the *Cenomyce rangiferina*, or *Cladonia rangiferina*, which forms the winter food of the reindeer. It is abundant in the pine forests of Lapland, and flourishes

even when they have been burnt. Reindeer feed upon it and dig for it when it is covered by snow. It tastes like wheat bran, but leaves a slightly burning sensation on the palate. It is the badge of the clan Mackenzie. See LICHENS.

REINHART, CHARLES STANLEY, an American artist; born in Pittsburgh, Pa., May 16, 1844; went to Paris in 1867, where he studied at the Atelier Suisse, and to Munich in 1868, where he attended the Royal Academy. In 1870 he entered the publishing house of Harper & Brothers, New York City, remaining there till 1876. After five years of independent art work he returned to Harpers in 1881, and in the same year went to Paris where he resided till 1886. He exhibited in Paris, Munich, and New York City. His paintings include "September Morning"; "Coast of Normandy"; "In a Garden"; and "Washed Ashore." He died in Philadelphia, Pa., Aug. 30, 1896.

REINITE, a tetragonal mineral occurring in octahedrons. Hardness, 4.0; sp. gr., 66.40; luster, dull; color, blackish-brown; streak, brown, opaque. Composition: Tungstic acid, 76.31; protoxide of iron, 23.68 = 99.99; formula as in Wolframite, $FeWO_4$. Found at Kimbosan, Kei, Japan.

REINSCH, PAUL SAMUEL, an American educator; born in Milwaukee, Wis., in 1869; was graduated at the University of Wisconsin in 1892 and at its Law Department in 1894. After studying abroad, he was Professor of Political Science at the University of Wisconsin 1899–1913. Minister to China 1913–1919. Publications include "The Common Law in the Early American Colonies" (1899); "World Politics at the End of the Nineteenth Century as Influenced by the Oriental Situation" (1900); "Colonial Government" (1901); "Colonial Administration" (1905); "Intellectual Currents in Far East" (1911).

REIS (rā'is), a Turkish title for various persons of authority, as for instance the captain of a ship. Reis Effendi was formerly the title of the Turkish chancellor of the empire and minister of foreign affairs.

REISNER WORK, a kind of inlaid cabinet work, on the principle of BÛHL (*q. v.*), but differing in being composed of woods of contrasted color; named after its inventor, Reisner, a German workman in the time of Louis XIV.

REITHRODON, a genus of *Murinæ,* with three species: *Reithrodon cuniculoides,* the rabbit-like Reithrodon, from Patagonia; *R. typicus,* from La Plata; and *R. chinchilloides,* from the Straits of Magellan. The profile is arched, the eyes large, ears hairy, first and fifth toes of hind feet very short, upper incisors grooved. The first species was discovered by Darwin. Fur yellowish gray, mixed with black, throat and belly pale yellow, rump and feet white; length of head and body about seven inches, tail half as much more.

RÉJANE, GABRIELLE, the stage name of Charlotte Réju, an actress on the French stage. Born in Paris in 1857, she entered at the Vaudeville in 1875 and became popular because of her impersonations. In 1893 Victorien Sardou wrote his "Madame Sans Gene," with Réjane in mind for the title rôle. She gained a tremendous success, and appeared in it in London and in the United States. In 1905 she founded the Théâtre Réjane. She died in 1920.

RELAPSING FEVER (also known as FAMINE FEVER and SEVEN-DAY FEVER), one of the three great species of continued fever, the two others being typhus and typhoid. It was first definitely discriminated from these diseases by Dr. Henderson of Edinburgh and other Scotch physicians about 1842. During the 19th century it was met with in Ireland, Scotland, England, in central and eastern Europe, the countries surrounding the Levant, north Africa, India, China, and, though never extensively, in North America. Relapsing fever usually begins suddenly with rigors, a sense of chilliness, and frontal headache. There is severe aching pain in the joints and muscles, and great sleeplessness; but delirium, if present at all, usually comes on only toward the end of the first week. After the above-described symptoms have lasted for a period varying from five to eight days, generally on the seventh day a sudden change takes place. This crisis commences with a copious perspiration, which is followed by a rapid falling of the pulse and temperature to or below the normal, and the patient appears nearly well. But from the fifth to the eighth day of this seeming convalescence a sudden relapse occurs, and all the primary symptoms return; these often run a rather shorter course than before, and again terminate in sweating and in a second convalescence, which is in most cases permanent. The relapse sometimes, however, occurs three or even four times. Death is a rare termination of relapsing fever; except enlargement of the spleen. One form of the disease, however, is much more severe, and very often fatal. It was originally described as a distinct disease under the

name of bilious typhoid, and is characterized by more marked implication of the digestive organs, by the constant presence of jaundice, and by absence or incomplete development of the crisis and intermission. It has now been shown to be really identical with relapsing fever proper. Relapsing fever is generally met with among those living under unfavorable hygienic conditions; it is specially apt to attack a population suffering from insufficient nourishment (hence the name famine fever), and is seldom met with among the upper classes, or among Europeans residing in the tropics, unless they are brought closely in contact with the sick. At the same time it is very infectious, spreading either directly from the patient to doctors, nurses, etc., or from clothes and bedding to washerwomen, who have suffered severely in some epidemics.

RELATIVITY OF KNOWLEDGE, a philosophical doctrine that is almost a commonplace in some philosophical schools, and is as strenuously denied by others. It is connected primarily with the contrast between the absolute and the relative, or the noumenon and phenomenon, and is one phase of the great discussions as to the relation of knowledge to reality. In its modern form the doctrine has obtained currency chiefly through the speculations of Kant, Hamilton, and Herbert Spencer. Knowledge evidently implies a knower and a relation between the knower and the object known. Hence it is argued that the object is conditioned by the relation into which it is brought; merely by becoming an object the thing as it is in itself undergoes a change or accommodation. Our knowledge therefore can never yield us the reality of things—the noumenon or thing-in-itself—but only the phenomenon, the thing as it appears to us. Or, as it is otherwise expressed, in being known the object must conform to the nature of the knowing faculty; the mental constitution or organization of the knower; we cannot, therefore, conclude, says Hamilton, that the properties of existence are known "in their native purity and without addition or modification from our organs of sense, or our capacities of intelligence." Hamilton's general conclusion is: "Of things absolutely or in themselves, be they external or be they internal, we know nothing, or know them only as incognizable; and we become aware of their incomprehensible existence only as this is indirectly or accidentally revealed to us, through certain qualities related to our faculties of knowledge. All we know is therefore phenomenal, phenomenal of the unknown." This is adopted by Spencer, and made the basis of his theory of knowledge, or rather of what Ferrier would have called his agnoiology, his doctrine of our necessary ignorance: "The reality existing behind all appearances is, and must ever be, unknown." In Kant a similar doctrine is associated with the asserted subjectivity of the forms of space and time; but it is also based on the broader consideration that perception can give us "only the relation of an object to the subject, not the inward essence which belongs to the object in itself." The empirical schools, which resolve our knowledge into impressions of sense manipulated according to the laws of association, likewise accept in its widest sense, as J. S. Mill points out, the doctrine of "the entire inaccessibility to our faculties of any other knowledge of things than that of the impressions which they produce in our mental consciousness." But, inasmuch as they in many cases profess a skeptical idealism which denies, or leaves doubtful, the existence of any reality beyond the states of consciousness, their views are less usually associated with the term.

The doctrine is frequently based on the large extent to which sensation enters into all our knowledge. In the structure of their sense organs different living creatures differ appreciably, and there will be a corresponding difference in the image of the world which they make to themselves. The knowledge of every being, it is argued, is thus inevitably conditioned by its organization, and there is no possibility of arriving at an objective criterion. Man, in the Protagorean formula, is the measure of all things; but he measure them only as they seem to him. Such a formula may be interpreted either in a sensationalistic and individualistic fashion, as seems to have been done by Protagoras, or in a rationalistic and humanistic fashion, as is seen in Kant. The case for the relativity of knowledge will be found strongly put in Sir W. Hamilton's "Discussions and Lectures on Metaphysics," in Dean Mansel's "Bampton Lectures," and in Herbert Spencer's "First Principles."

RELEASE, a discharge of a right; an instrument in writing, by which estates, rights, titles, entries, actions, and other things are extinguished, and discharged, and sometimes transferred, abridged, or enlarged; and, in general, a person's giving up or discharging the right or action he has, or claims to have, against another or his lands. In mechanics, the opening of the exhaust port of the steam

engine, before the stroke is finished to lessen the back pressure.

RELICS, personal memorials of those among the dead who have been distinguished during life by eminent qualities: especially, in the history of the Church, objects which derive their value from their connection with our Lord and with the saints; as, for example, fragments of our Lord's cross or crown of thorns, portions of the dust, the bones, the blood, the instruments of torture, the chains, etc., of the martyrs, the mortal remains, the clothes, the books, and other objects of personal use of the other saints. With them may be grouped objects to which a certain indirect sacred interest is given by their being brought into contact with the direct memorials of the distinguished dead, as by their being placed on the tombs of the martyrs, touched with the relics, or blessed at the shrine or sanctuary of the saints, etc. Reverence for relics developed with the increasing honor that was paid to martyrs.

The earliest monuments of Christian history contain evidences of the deep and reverential affection with which martyrs of the faith, their mortal remains, and everything connected with their martyrdom were regarded by their fellow Christians, and for which Roman Catholics profess to find warrant in many passages of the Old and of the New Testament, as Ex. xiii: 19; II Kings xiii: 21; and xxiii: 16-18; Matt. ix: 20-22; Acts v: 12-16, and xix: 11, 12. The letter of the Church of Smyrna attests this plainly as to the martyrdom of Polycarp; Pontian's "Life of Cyprian" tells of their stealing the martyr's body, and carrying it away by night in holy triumph. The Apostolic Constitutions bear witness to the honors paid. Miracles, too, are described as connected with relics. Thus, Ambrose tells of a blind man's sight being restored by his touching the bodies of the martyrs Gervasius and Protasius; and similar wonders are detailed by Gregory Nazianzen, Chrysostom, and Leo the Great; so that the possession of relics of the martyrs, and even the occasional touching of them, was regarded as a special happiness. According to Theodoret, even cities were content to share with each other portions of the sacred treasure. Connected with this feeling, too, is found a belief of a certain sacred efficacy in the presence or the touch of the relics; and especially there is ascribed by Chrysostom, Basil, Theodoret, and other fathers, to prayers offered before the relics, a virtue in dispelling or warding off sickness, diabolical machinations, and other evils. Hence we find that altars were erected over the tombs of the martyrs, or at least that relics were invariably placed on the altars, wherever erected; insomuch that the Trullan Council ordered the demolition of all altars in which no relics had been deposited. Far more sacred than the relics of martyrs was the cross of our Lord, which was believed to have been discovered at Jerusalem by Helena, mother of the Emperor Constantine. Minute portions of the wood were distributed to the principal churches; and Cyril of Jerusalem, within less than a century after the discovery of the cross, describes the precious wood as dispersed throughout the world. According to Rohault de Fleury, "The total cubic volume of all the known relics of the True Cross is about 5,000,000 cubic millimeters, whereas a cross large enough for the execution of a man must have contained at least 180,000,000 or thereby." The practice of relic worship and the feeling on which it was founded, were not suffered to pass without a protest. At quite an early period many abuses and superstitions had crept in, which even the fathers who admit the worship do not fail to condemn; and Vigilantius, in a treatise now lost, reprobated in the strongest terms the excesses to which it was carried, and indeed the essential principles on which the practice rests. He had so few followers, however, that were it not for the refutation by Jerome of his work against relics we should have no record of his opposition to the popular view; and it is urged by Roman Catholics, as a proof of the universal acquiescence of the Church of the 4th century in the practice of relic-worship, that it was not even found to be necessary to call a single council for the purpose of condemning Vigilantius.

The writings of Augustine, of Paulinus of Nola, of Ephraem the Syrian, of Gregory the Great, and others are full of examples of the miraculous virtue ascribed to relics, and of the variety and the extensive multiplication of sacred memorials of all kinds. Nor was this confined to the orthodox alone; all the different parties in the controversy on the Incarnation agreed with Roman Catholics and with one another on this subject, and even the Iconoclasts, at the very time that they most fiercely repudiated the use of images, admitted without difficulty the veneration of relics.

In the age of the Crusades a fresh impulse was given to the worship of relics in the West by the novelty and variety of the sacred objects brought home from the churches of Syria, Asia Minor, and Constantinople by crusaders,

by palmers returning from Palestine, and by the Latin conquerors of Constantinople; and it is admitted by the most zealous Roman Catholics that at this period many false, and perhaps even absurd and ridiculous relics were introduced, and were successfully commended to the veneration of individuals or individual churches in the West; nor do they venture to doubt that abuse and superstition found their way side by side with what they regard as the genuine and authorized worship of the Church. Nevertheless, with the exception of the Waldenses, Wyclif, and a few isolated individuals, the practice remained unchallenged till the 16th century, when, in common with many other doctrines and practices of the Church of Rome, it was utterly repudiated by the Reformers. Roman Catholics, however, allege that the practice, as sanctioned by the Church, has nothing in common with the abuses which form the main ground of the objections alleged by Protestants. The Roman Catholic use of relics, as authorized by the Church, is to serve as incentives to faith and piety, by recalling vividly to men's minds the lives, and, as it were, the corporeal presence and the earthly converse of the saints, and thus placing before them, in a more touching manner, the virtues which, in the examples, are held up for men's imitation. The decree of the Council of Trent connects the subject of relic worship with the general question of saint worship, and regards the relics of the saints not as possessing intrinsic virtue, but only as instruments "through which God bestows benefits on men." The Fourth Lateran Council (1215) forbade the sale or veneration of relics till their authenticity had been approved by the authorities; the Council of Trent renewed the prohibition. In the pastoral of the Bishop of Treves, inviting pilgrims to the exhibition of the Holy Coat (1891), it is expressly stated that "the authenticity of no relic, be it the most eminent of the oldest Church of Christendom, falls under any precept of Catholic faith." Relics are usually venerated in costly cases or "reliquaries" set on the altar; they are also carried in procession, and the faithful are blessed with them.

The Greek and other Oriental Churches, and most of the Oriental sects, agree with Roman Catholics in the practice of relic worship. On the contrary, the Reformed Churches, without exception, have rejected the usage; though non-religious relic worship is rife enough, in the form of swords of Wallace and Bruce, locks of Prince Charlie's hair, etc. The practice of relic worship forms a notable feature of the Mohammedan usage of pilgrimages, and is an even more important feature of Buddhism.

RELIEF, a fine or composition paid by the heir of a tenant, holding by knight's service or other tenure, to the lord on the death of the ancestor for the privilege of succeeding to the estate, which by strict feudal law had lapsed or fallen to the lord on the death of the tenant.

In physical geography, the undulations or surface elevations of a country. In painting, the appearance of projection and solidity in represented objects, so as to cause them to appear precisely as they are found in nature. In sculpture, architecture, etc., the prominence of a sculptured figure from the plane surface to which it is attached. According to the degree of prominence, it is known as alto-relievo, or high relief, mezzo- or demi-relief, and bas-relief, or low relief.

RELIEF, WAR. When the war broke out in Europe in 1914 very little time was allowed to pass before organizations were brought into being for the purpose of assisting the people in Europe who were the chief sufferers in the zones affected. Sympathy was particularly aroused on behalf of the Belgians who were recognized as having no part in the opening of hostilities, and who bore the chief brunt of the first German attacks. The other peoples whose lands formed the terrain over which the first battles were waged, northern France, Poland, Serbia, and other countries, likewise were included in the appeal for aid addressed to the citizens of the United States. Moreover, the desolated lands of Hungary and east Germany were the objects of much sympathy, particularly among people having kin in the countries of the Central Powers, before the United States entered the war, but relief in that direction was largely blocked, for the British navy held the seas and made communication with the Central Powers difficult. But measures for war relief were developed on a very large scale. A Commission for Relief in Belgium was one of the first organizations formed, but the Red Cross, the Rockefeller Foundation, the Allied War Charities, and similar organizations were soon active both in campaigns for subscriptions and in the distribution of war relief over wide areas. The enormous variety of suffering that followed in the train of the war called for heroic measures and as the months passed and it was borne in on the world that the war was to be a long one, the organizations devoted to the work of war relief extended their activities in every direction. Not only had the families left behind by the bread-

winners to be assisted, but disabled soldiers had to be taken care of, and when the United States entered the war, much of the kind of relief that went to Europe had to be dispensed also in this country.

The Commission for Relief in Belgium was organized in October, 1914, and carried out its distribution of supplies through the Comité Nationale de Secours et d'Alimentation. The personnel was American until the declaration of war by the United States, but thereafter the work in Belgium was intrusted to Spanish and Dutch citizens appointed by their governments. Through the work of this commission something like 7,000,000 people were regularly provided with food. Warehouses were established in Holland and Belgium, and these received American and Argentine supplies from the port of entry at Rotterdam. Up to June 1, 1917, a total of nearly $300,000,000 was spent by the commission.

As the war went on the number of relief organizations greatly increased, and some of them came to wear a doubtful character. There were, however, 80 such organizations working in New York City that were vouched for by the Charity Organization Society, and the chief among them made it their object to distribute necessities, such as food and clothing. Every known device was employed in the campaigns to raise foods, bazaars, concerts, street collecting, and the like. These became so numerous that division of responsibility and proper accounting became manifestly impossible, but the public continued to give, and though millions of dollars went into the wrong hands, the stream of supplies going to Europe continued to grow.

Among the other organizations that devoted their energies to the work of relief were the Allied War Charities, which through nearly 80 subsidiary organizations, covered the whole nation; the American Fund for French Wounded, the Secours National Fund for the relief of French women and children, the Serbian Relief Committee, the American ambulance, which organized ambulance sections for work behind the battle line; Jewish Relief, the British War Relief Association, the American Committee for Training in Suitable Trades the Maimed Soldiers of France, the Vacation War Relief Committee, the Polish Victims' Relief Fund, the Lafayette Fund, the American Girls' Aid for the Collection of Clothing for the Victims of the World War in France, the Duryea War Relief, the French Comfort Packets' Committee for the United States and Allies, the Stage Women's War Relief, the Committee of Mercy, Le Bien Etre du Blessé, the New York Committee for the Fatherless Children of France, the Dollar Christmas Fund for Destitute Belgian Children, the French Tuberculosis War Victims' Fund, the American Committee of the Scottish Women's Hospital for Home and Foreign Service, the National Allied Relief Committee, the Balkan Refugees and Sufferers, Polish Refugees, War Babies' Cradle, the Polish Children's Relief Fund, the American Committee for Armenian and Syrian Relief, the New York Surgical Dressings Committee, and many others. New organizations continued to be formed while the war lasted, and none of them appeared to find difficulty in raising funds. See RED CROSS, KNIGHTS OF COLUMBUS, JEWISH WELFARE BOARD, ETC.

RELIGION, a term that since the 16th century has become naturalized in most European languages. It has even in the Teutonic tongues taken the place of the native terms formerly in use. As to its etymology, the derivation from *relinquere* is universally recognized to be inconsistent with phonetic laws; the necessity for assuming the existence of a lost transitive verb *ligere*, "to look," has not been made out; and the derivation from *relegere*, which implies carefulness and attention to what concerns the gods to be the primary signification of the word, is better than that from *religare*, which refers the origin of religion to a sense of dependence on or connection with Deity by the bond of piety, inasmuch as the latter does not accord with the way in which the ancient Romans used the terms *religens* and *religiosus*, and supposes in them a higher conception of religion than they are likely to have possessed. The Lactanian derivation (*religare*), however, has not been shown to violate any known linguistic law; and the reason which Professor Max Müller gives ("Natural Religion," p. 35) as "the real objection" to it does not apply to it at all. It is not "the fact that in classical Latin *religare* is never used in the sense of binding or holding back." Binding or holding back, or behind, or fast, is its common meaning in classical Latin; it is its meaning in Cæsar, Cicero, Suetonius, Vergil, Horace, and Ovid. Its only other meaning is to unbind.

General terms equivalent in meaning to religion are not to be found even in such languages as Chinese, Sanskrit, Hebrew, or Arabic, and need not of course be looked for in the languages of uncultured peoples. There is no definition of religion in the Bible, nor any designation or description of it which applies to the heathen religions. The

fathers and Schoolmen attempted only to give a definition of true religion. The difficulty of framing a correct definition of religion is very great. Such a definition ought to apply to nothing but religion, and to differentiate religion from everything else, as, for example, from imaginative idealization, art, morality, or philosophy. It should apply to everything which is naturally and commonly called religion; to religion as a subjective spiritual state, and to all religions, high or low, true or false, which have obtained objective historical realization. And it should neither expressly nor by implication exclude any essential element of religion, but express in a general way all that is necessarily included in its nature, indispensible to its notion. Since the need for definitions of this kind was felt—*i. e.*, since the comparative study of religions began to be cultivated—numerous attempts to supply it have been made, but few, if any, of the definitions of religion as yet proposed fulfill all the requirements. Those of Kant, Fichte, Schleiermacher, Hegel, Strauss, Wundt, Pfleiderer, Herbert Spencer, Matthew Arnold, Tylor, John Caird, and Max Müller have attracted most attention.

The classification of religions also presents great difficulties. To distribute them into (1) true and false religions, or (2) natural and revealed religions, or (3) natural and positive religions, or (4) religions of savage and of civilized peoples, or (5) book-religions and religions not possessed of sacred books, or (6) individual religions (*i. e.*, founded by great individual teachers) and natural or race religions (*i. e.*, the collective products of peoples or races, the growth of generations), must obviously be scientifically inadequate and unsatisfactory, though some of the classifications thus obtained may not be without truth or interest. Max Müller holds that "the only scientific and truly genetic classification of religions is the same as that of languages," and Maurice Vernes that they must be classified according to races. And there can be no doubt that, if religions, languages, and races are properly classified, the classifications will, on the whole, correspond or coincide. Still they ought to be classified independently, from a study of their own proper natures, and a complete accordance of their classifications is not to be looked for. The fact, for instance, that there are universal religions, religions not limited by language or race, must not be ignored or depreciated. Hegel's classification is very ingenious and suggestive. He distributes religions into religions of nature, religions of spirituality, and the absolute or Christian religion, answering respectively both to the chief stages of the historical realization of religion, and to the childhood, youth, and manhood of humanity. The religions of nature are represented as including (1) immediate religion (sorcery and fetish-worship); (2) pantheistic religion, which comprehends the religion of measure (China), the religion of phantasy (Brahmanism), and the religion of being-in-itself (Buddhism); and (3) religion which tends to freedom, and which is exemplified in the religion of the good or of light (ancient Persian), the religion of sorrow (Syrian), and the religion of mystery (Egypt). The religions of spirituality are held to be these three—the religion of sublimity (Hebrew), the religion of beauty (Greek), and the religion of the understanding (Roman). The classification of Von Hartman is of the same character, being very ingeniously conformed to the needs of his own philosophy, and yet not conspiciously inconsistent with the facts. The classifications of Lubbock, Tylor, Spencer, Reville, and D'Alviella deserve attention as being based on an extensive and close study of religions, including those vague and rude religions to which it is especially difficult to assign appropriate places in a natural and comprehensive scheme of distribution. No general agreement, however, has been as yet reached either in determining the species of these religions or the order of their succession.

Professor Tiele classifies religions as follows: I. Nature religions, which comprehend (*a*) Polydæmonistic magical religions under the control of animism; (*b*) Purified or organized magical religions—Therianthropic polytheism (1) unorganized, and (2) organized; (*c*) Worship of manlike but superhuman and semi-ethical beings—Anthropomorphic polytheism. II. Ethical religions, which are either (*a*) National nomistic (nomothetic) religious communities—Taoism, Confucianism, Brahmanism, Jainism and Primitive Buddhism, Mazdaism, Mosaism, and Judaism; or (*b*) Universalistic religious communities—Islam, Buddhism, Christianity.

Religion is virtually universal, though, of course, neither the possibility nor the existence of atheism can be reasonably denied. The instances which Büchner, Lubbock, and others have adduced to prove that there are whole peoples destitute of religion will not stand the test of examination. Not one adequately attested case of the kind has yet been produced; and even if such a case were

established it would go only a very little way toward proving that man is not naturally and normally a religious being.

The starting point of religious development has been variously represented as fetishism (De Brosses, Comte, Tylor), belief in ghosts (Spencer, Caspari, Le Bon), polytheism (Hume, Voltaire, Dupuis), pantheism (Tholuck, Ulrici, Caird), henotheism (Schellin, Max Müller, Von Hartmann), and monotheism (Creuzer, Professor Rawlinson, Canon Cook). All these representations are conjectural. The present state of our knowledge does not enable us to decide what the primitive religion was. Historical research does not take us back to it. Nor does it show us what stages of religion intervened between it and the earliest known historical religions. The ways in which the ruder phases of religion are represented by anthropologists and comparative theologians as having succeeded one another are merely more or less suggestive hypotheses, founded on data both insufficient and ambiguous. All serial arrangements of the kind ought to be regarded as of a merely logical, non-historical character, though they may, perhaps, aid in leading to a discovery of the historical order of development. Hence the best mode of arranging the ruder religions may be that which begins with the logically simplest phase of religion, and assigns the others a place in the order of their logical dependence and complexity. Adopting this principle, Naturism, the worship of natural objects regarded as powers or agents, should come first, implying as it does no original or special faculty or tendency, and being the direct and natural interpretation of physical facts. It may have many forms corresponding to the differences of the natural objects, and these forms may imply very different degrees of intellectual capability and very different qualities of disposition in the worshipers, though they have certainly not been shown to be successive stages of religious development. Nature worship affords a basis for all other forms of religion and worship, and in most of them its presence as a constituent is obvious. It is difficult, if not impossible, to conceive how men could have risen to any higher stage of religion except by means of it, or how they could have failed to enter it unless raised above it by a special revelation. And the notion of a special revelation to men who had not by natural means acquired any belief in or thought of deity is scarcely conceivable. Animism comes next as a natural result of the growth of the idea of soul. It is often indistinguishable or difficult to distinguish from nature worship, which is, as it were, implicit animism, while animism is explicit nature worship. When man has drawn a distinction between body and life or soul, it is natural that he should work it out in regard to himself, and then judge of other things by himself; and the phenomena of sleep and dreams, of swooning, apoplexy, ecstasy, insanity, and death, all contribute to mold his thought when once they have been turned in this direction. Hence a third phase of religion, spiritism, in which the souls worshiped are human, or conformed to the human type and conceived of according to human experience, but affected and modified by physical impressions and analogies. The hypothesis of Mr. Spencer that religion begins at this stage, the first deities being deceased ancestors, and the first worship funeral rites, takes no account of a vast mass of philological evidence which establishes that the names of the oldest known gods were descriptive of natural phenomena, and of historical evidence which shows that ancestor worship has been grafted in various localities on an older nature worship. It also rests on a very improbable assumption as to savage man's mode of viewing natural objects worshiped, and fails to explain the common features, similarities, and analogies in the various mythologies, the transformations of the ghosts into gods, the inferior position of properly ancestral gods, and especially the characteristics of nature worship. The fourth phase of religious development is Polytheism in the special sense of the term, anthropological mythology, the worship of divine individualities, generally in origin nature gods, but transformed by imagination operating under the belief that beings analogous to the human rule the course of things. The fifth phase is that in which polytheism is subordinated to, or reduced under, a Dualistic or Monistic conception of the divine. The conception may be mainly reached either by speculative or ethical thought. The sixth phase is represented by the Monotheistic religions—the Jewish, Christian, and Mohammedan. These religions all claim to rest on special revelation. In them only is belief in a plurality of gods entirely transcended. Philosophical monism in a religion does not cast out polytheism. Fetishism, image worship, totemism, shamanism, and sorcery probably should be regarded not as distinct phases or natural logical stages of religious development, but as adjuncts and incidental perversions of religion which pre-suppose its normal or logical phases

or stages. An adequate proof of this view would necessarily dislodge and destroy a number of current hypotheses.

The theories regarding the psychological origin and the essence of religion are numerous and divergent. It was common among the atheists of the 18th century to speak of religion as the invention of individuals desirous of deceiving their fellowmen in order to further their own selfish and ambitious views. Feuerbach, Lange, Spencer, and others account for its appearance by imagination, illusion, or the misinterpretation of ordinary or exceptional phenomena. Some zealous supernaturalists have argued that it must have originated in a primitive revelation. It may be referred exclusively to the intellectual province of human nature. This mistake, however, is too gross to have been often committed, and is sufficiently refuted by the obvious consideration that the measure of religion is not the measure of intelligence or of knowledge. Hegel did not, as is often said, fall into the error of identifying religion with thought, but only emphasized strongly the importance of thought in religion. Peschel regards the principle of causality, and Max Müller the perception of the infinite, as the roots of religion. And it may well be admitted that without both of these intellectual principles religion would be impossible. But are they more than merely conditions of its appearance? The origin of religion is, of course, referred to intellect by those who hold that God is known intuitively, perceived directly, apprehended without medium; but both psychology and history, both internal analysis and external observation seem to disprove this hypothesis. Religion has often been resolved into feeling or sentiment. Thus Lucretius, Hobbes, and Strauss have traced it mainly to fear; the followers of Ritschl to a desire to secure life and its goods amidst the uncertainties and evils of earth; the disciples of Schleiermacher to a feeling of absolute dependence, of pure and entire passiveness; and others—*e. g.*, Brinton and Newman Smyth—to the religious feeling regarded either as a distinct primary feeling or a peculiar compound feeling. Kant represented religion as essentially a sanction for duty, and Matthew Arnold has defined it as "morality touched by emotion," "ethics heightened, enkindled, lit up by feelings." This great diversity of views of itself indicates what investigation is found to confirm—viz., that religion is a vast and complex thing, an inexhaustible field for psychological study. Almost all the views referred to have some truth in them, and most of them are only false in so far as they assume themselves to be exclusively true. The whole nature of man has been formed for religion, and is engaged and exercised in religion. Every principle of that nature which has been singled out as the root of religion has really contributed to its rise and development. The study of religion as a process of mind, and of the factors which condition and determine its development, is the special task of the psychology of religion, a department of research to which many contributions have been made since Hume initiated it in his "Natural History of Religion" (1759) by showing the importance of the distinction between the causes and the reasons of religion.

A religion is a group or whole of religious phenomena—of religious beliefs, practices, and institutions—so closely connected with one another as to be thereby differentiated from those of any other religion. Each religion has had a history and its rise and spread, formation and transformations, as a religion can only be truly traced by being historically traced. Also religions are historically connected, are related to one another, and have influenced one another, in ways which may be discovered, and can only be discovered, by historical research. Hence the history of religions is also the history of religion, not an aggregation of the histories of particular religions, but a truly general history. Like the histories of art, industry, science, and society in general, it is found on examination to have been a process of development in which each stage of religion has proceeded gradually from antecedent factors and conditions. The precise nature of the development can only be ascertained by investigation of the history itself. No hypothesis of development should be assumed as a pre-supposition of such investigation. Naturalistic apriorism is as illegitimate in historical inquiry as theological or metaphysical apriorism. The history of religion is not only of great importance in itself, but indispensable to the right understanding of general history, of the history of art, of philosophy, etc. It has been studied with more zeal and success during the 19th century than in all the preceding ages. The history of religious beliefs is, of course, only a part of the history of religions. It is, however, distinguishable, though inseparable, from it, and is often and conveniently designated Comparative Theology. It comprehends comparative mythology and the history of doctrines, myths being beliefs

which are mainly the products of imagination and doctrines of reflection.

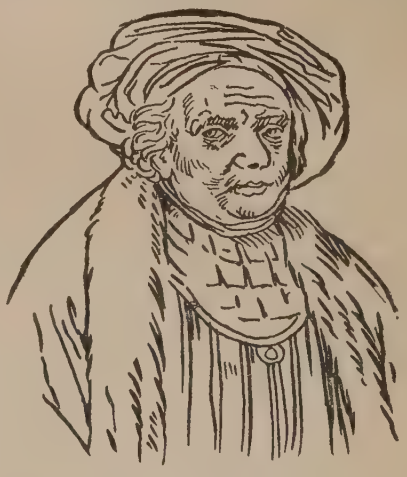
The Psychology of Religion, the History of Religions, and Comparative Theology are clearly distinct, and ought not to be confounded. At the same time they are closely connected. They agree in that they are alike occupied with religion as an empirical fact. Hence they may be regarded as parts of a comprehensive science, to which it might be well to confine the designation "Science of Religions," instead of using it in the vague and ambiguous way which is so common. Thus understood, the Science of Religions may be said to deal with religion as a phenomena of experience, whether outwardly manifested in history or inwardly realized in consciousness; to seek to describe and explain religious experience so far as it can be described and explained without transcending the religious experience itself. Its students have only to ascertain, analyze, explain, and exhibit experienced fact. Were religion a physical fact, to study it merely as a fact would be enough. The astronomer, the naturalist, the chemist have no need to judge their facts; they have only to describe them, analyze them, and determine their relations. But it is otherwise with the students of religion, of morality, of art, of reasoning. They soon come to a point where they must become judges of the phenomena and pronounce on their truth and worth. Experience in the physical sphere is experience and nothing more; experience in the spiritual sphere is very often experience of what is irreverent and impious, immoral and vicious, ugly and erroneous, foolish or insane. Has the mind simply to describe and analyze, accept, and be content with such experience? Even the logician and the æsthetician will answer in the negative, will claim to judge their facts as conforming to or contravening the laws of truth and the ideals of art. Still more decidedly must the moralist and the student of religion so answer. Religion, then, is not completely studied when it is only studied historically. Hence it must be dealt with by other sciences or disciplines than those which are merely historical. What these are, and how they are related to religion, the writer has elsewhere endeavored to show.

All the particular theological sciences or disciplines treat of particular aspects of religion or of religion in particular ways. Their relationships to one another can only be determined by their relationship to it. They can only be unified and co-ordinated in a truly organic manner by their due reference to it. When religion is studied not merely in particular aspects and ways, but in its unity and entirety, with a view to its comprehension in its essence and all essential relations, it is the object of the Philosophy of Religion. Though a distinct and essential department of philosophy, and the highest and most comprehensive theological science, the philosophy of religion could only appear in an independent and appropriate form when both philosophy and theology were highly developed. It is, therefore, of comparatively recent origin, and indeed was chiefly cultivated in Germany during the 19th century.

RELIQUARY, a depository for a relic or relics; a casket or case in which relics are kept.

REMAINDER, in law, an estate in remainder may be defined to be an estate limited to take effect and be enjoyed after another estate is determined. Thus if a man seized in fee simple grants lands to A for 20 years, or other period, and, after the determination of the said term, then to B and his heirs forever, here A is tenant for years, with remainder to B, since an estate for years is created out of the fee, and given to A, and the residue or remainder to B. Also in publishing, an edition, the sale of which has practically ceased, and which is cleared by the trade at a reduced price.

REMBRANDT, VAN RYN, one of the most celebrated painters and engravers of the Dutch school; born in Leyden,



VAN RYN REMBRANDT

Holland, July 15, 1606. He acquired his art from several masters at Amsterdam, and early in life grew famous. Rembrandt was master of all that relates to coloring, distribution of light and shade, and composition. His etchings have

wonderful freedom, facility, and boldness. Rembrandt was twice married, resided during the greater part of his life at Amsterdam. Among his well-known works are: "The Anatomical Lecture" (1632); "Descent from the Cross" (1633); "St. Thomas" (1634); "Tobias and the Angel" (1638); "Portrait of his Mother" (1639); "The Gilder" (1640); "The Night Watch" (1642) considered his masterpiece; "Christ Healing the Sick" (1651); "Burgomaster and Wife" (1657); "The Synodics" (1661); and "The Betrothed Jewess" (1669). He died in Amsterdam and was buried Oct. 8, 1669.

REMENSNYDER, JUNIUS BENJAMIN, an American clergyman; born in Staunton, Va., Feb. 24, 1843; was graduated at Pennsylvania College, Gettysburg, in 1861, and at its theological seminary in 1865; was ordained in the Lutheran Church in 1865; held a charge in Philadelphia in 1865–1874, and in Savannah, Ga., in 1874–1880. In the latter year he was called to St. James' Lutheran Church in New York. His publications include "Heavenward" (1874); "Doom Eternal"; "Lutheran Literature"; "Work and Personality of Luther"; "Six Days of Creation"; "What the World Owes to Luther" (1917); "Lights on the Shadows of Life" (1919).

REMENYI, EDOUARD, a Hungarian violinist; born in Heves, Hungary, in 1830; received a musical education at the Vienna Conservatory. In 1851, after the Hungarian revolution, he was forced to flee to the United States, but returned to Europe in 1853. In 1854 he visited London, where he was appointed solo violinist to Queen Victoria. In 1860 he obtained his amnesty and returned to Hungary, where he attained to great distinction. In 1865 he went to Paris, achieving there a tremendous success. Thenceforth he made repeated concert tours on the Continent and in England. In 1878 he returned to the United States, where he spent much of his time and gave many concerts. He died in San Francisco, Cal., May 15, 1898.

REMEY, GEORGE COLLIER, an American naval officer; born in Burlington, Ia., Aug. 10, 1841; was graduated at the United States Naval Academy in 1859; served with distinction during the Civil War, and was captured during the assault on Fort Sumter, in 1863. When the war with Spain broke out he was placed in command of the naval base at Key West, Fla. He was promoted rear-admiral in 1898, and in 1900 was given command of the Asiatic Station at Yokohama, where he directed the operations of the United States naval forces in China.

REMIGIUS, the name of three eminent French ecclesiastics, the most famous of whom (St. Remigius or St. Remy) was Bishop of Rheims for over 20 years, and in 496 baptized Clovis, King of the Franks and founder of the French monarchy.

REMINGTON, FREDERIC, an American artist and author; born in Canton, N. Y., Oct. 4, 1861; was educated at the Yale Art School, and at the Art Student's League, New York. In early life he became a cowboy and stockman on a ranch in Montana. He became an illustrator for magazines, treating of military and Western subjects, and during 1897-1898 of Cuban scenes. Among his best-known productions are, "An Impression from the Pony War Dance"; "The Last Lull in the Fight"; "The Last Stand"; "The Advancer, or, The Military Sacrifice"; "The Arrival of the Courier"; "A Buck Jumper," etc. He published "Crooked Trails"; "Frontier Sketches"; and "The Sundown Leflare." In sculpture, Mr. Remington has produced "The Broncho Buster"; "The Wounded Bunkie"; etc. He was conspicuous for his success in "black and white." He died in 1909.

REMINGTON, PHILO, an American inventor; born in Litchfield, N. Y., Oct. 31, 1816. He entered the small arms factory of his father, and for 25 years superintended the mechanical department. The perfecting of the Remington breech loading rifles and of the Remington typewriter was largely due to his inventive skill. In 1886 he retired, and in 1889 he died.

REMITTENT FEVER, one of the varieties of fever arising from malaria or marsh poison—one being intermittent fever, or ague. In its milder forms it scarcely differs from severe intermittent fever; while in its more serious form it may approximate closely to yellow fever. The attack may be either sudden or preceded by languor, chilliness, and a general feeling of illness. Then comes a cold stage, usually of short duration. This is followed by a hot stage, in which the symptoms are commonly far more intense than those exhibited in the worst forms of ague. Giddiness proceeding to delirium is not uncommon, and is a bad symptom; while in other cases drowsiness or lethargy is one of the most marked symptoms. There is often great tenderness or pain in the region of the stomach, and vomiting—the vomited matter frequently containing bile or blood. A remission of these symptoms occurs, in mild cases, in six or seven

hours; but in severe cases the paroxysm may continue for 24 hours or longer. The remission is sometimes, but not always, accompanied with sweating. The duration of the remission is as varied as that of the paroxysm, varying from 2 or 3 to 30 hours, or even longer. The fever then returns with increased severity, and without any cold stage; and then the paroxysms and remissions proceed, most commonly according to no recognizable law, till the case terminates either fatally or in convalescence. In favorable cases convalescence is usually established in about a week. The severe forms of this fever are often accompanied with more or less jaundice, and hence the disease has received the name of bilious remittent fever. It is also known as jungle fever, lake fever (from its prevalence on the border of the great African lakes); and the African, Bengal, Levant, Walcheren, and other similar local fevers are merely synonyms of this disease. In England the disease is very rare; and when it occurs it is usually mild. The disease is most severe in southern Asia, western Africa, central America, and the West India Islands.

The first object of treatment is to reduce the circulation during the hot stage. This is done by a dose of five grains each of calomel and James' powder and after an interval of three or four hours, by a sharp cathartic—as, for instance, the ordinary black draught. On the morning of the following day the remission will probably be more complete, when quinine should be freely and repeatedly administered. A mixture of antimonial wine with acetate of potash should also be given every two or three hours, so as to increase the action of the skin and kidneys. The patient must be carefully watched during the period of convalesence. A timely removal from all malarious influence, by a change of climate or a sea voyage, is of the highest importance.

REMONSTRANTS, a name given to the Dutch Protestants, who, after the death of Arminius (A. D. 1609) continued to maintain his views, and in 1610, presented to the States of Holland, at Friesland, a remonstrance in five articles formulating their points of departure from Calvinism.

REMORA, the sucking-fish, or sucker; a popular name for any species of the genus *Echeneis;* specifically, *E. remora*, about eight inches long, common in the Mediterranean. By means of the suctorial disk, a transformation of the spinous dorsal fin, the species can attach themselves to any flat surface. The adhesion is so strong that the fish can be dislodged only with difficulty, unless pushed forward with a sliding motion. Being bad swimmers, they attach themselves to vessels, or to animals having greater power of locomotion than themselves; but they cannot be regarded as parasites, as they do not obtain their food at the expense of their host. It has been believed that the remora is able to arrest vessels in their course; this is fabulous, though the attachment of one of the larger species may retard the progress of sailing, especially when, as is sometimes the case, several individuals accompany the same ship.

REMSEN, IRA, an American chemist; born in New York City, Feb. 10, 1846; was graduated at the College of the City of New York in 1865, and later College of Physicians and Surgeons, and University of Göttingen; was Professor of Chemistry at Williams College in 1872–1876; founded the "American Chemical Journal" in 1879. He was the author of numerous text-books including "The Principles of Theoretical Chemistry"; "Inorganic Chemistry"; "Chemical Experiments"; "Laboratory Manual," (1895) "The University Movement," (1915) etc., became Professor of Chemistry at Johns Hopkins University in 1876, and succeeded Dr. Daniel Coit Gilman as president there in 1901.

REMUS, the twin brother of Romulus, who was the fabled founder of Rome. According to the old myth, Romulus killed his brother.

RÉMUSAT, FRANÇOIS MARIE CHARLES, COMTE DE, a French author; born in Paris, March 14, 1797, the son of Augustin Laurent, Comte de Rémusat (1762–1823). Rémusat early developed Liberal ideas, and took eagerly to journalism. He signed the journalists' famous protest against the Ordinances of Polignac, which brought about the "July revolution," and was elected deputy for Toulouse; allied himself with the Doctrinaire party, and in 1836 became under-secretary of state for the interior; in 1840 minister of the interior, he was exiled after the coup d'état of Louis Napoleon. In 1871, he held the portfolio of foreign affairs. He died June 6, 1875.

RÉMUSAT, JEAN PIERRE ABEL (rā-mü-sä), a French Orientalist; born in Paris, Sept. 5, 1788. He studied medicine, and took his diploma in 1813; but as early as 1811 he had published an essay on Chinese literature. In 1814 he was made Professor of Chinese in the College of France. His most important work was "Elements of Chinese Gram-

mar" (1822). He wrote also on the origin of Chinese writing (1827), on Chinese medicine, on the topography and history of the Chinese empire, and "Asiatic Miscellanies" (1843). In 1818 he became one of the editors of the "Journal des Savants"; in 1822 he founded the Asiatic Society of Paris; and in 1824 he was appointed curator of the Oriental Department in the Royal Library. He died in Paris June 3, 1832.

RENAISSANCE, a name given to the great intellectual movement which marks the transition from the Middle Ages to the modern world. It was a change in attitude of mind and ideal of life, in philosophy, art, literary criticism, political and religious thought. Substantially a revolt against the dogmatism of the Middle Ages, the new spirit claimed the entire liberation of reason, aimed at a complete rehabilitation of the human spirit with all the free activities and arts and graces which invested the classical age. Zeal for the Litteræ Humaniores brought forth a new ideal of culture, and the new view of life for which the name of Humanism is frequently used. Renaissance, rebirth, was originally used as synonymous with the Revival of Letters, the revived study in a new spirit of the classical languages and classical literatures of Greece and Rome. The new spirit powerfully aided in weakening the power of the papacy, in the establishment of Protestantism and the right of free inquiry. Under its impulse astronomy was eventually reformed by Copernicus and Galileo, and science started on its modern unfettered career; by it, too, feudalism, which had been weakened by the communal movements of the Middle Ages, was abolished, and the demand for political liberty was advanced. National languages began to flourish. To the same general impulse belonged also the invention of printing and multiplication of books, new methods of paper making, the use of the mariner's compass, the discovery of America, and the exploration of the Indian Sea. The fall of the Eastern empire in 1453 sent Greek scholars to promote the revival of scholarship already in progress in western Europe. No definite date can be given for the beginning of the Renaissance. In its main elements the movement originated in Italy toward the end of the 14th century, and, attaining its full development there in the earlier half of the 16th the Renaissance communicated itself throughout the whole of the rest of Europe; France, Germany, England, and other countries participating later in the movement. The culmination of the Renaissance in Italy may be regarded as having fallen within the half century 1456–1500; and its close for the land of its birth may be fixed at the sack of Rome in 1527 by the Constable de Bourbon, followed by the transference of Humanism in its later developments to France, England, and the rest of Europe.

In Germany the change was as marked as in Italy, but the Humanism of Germany and the Low Countries was very different in spirit from that of Italy. Not less tinged by a revived love for ancient learning, it was never divorced from morality nor hostile to Christianity; and its most important direct outcome was the Reformation. Biblical and Oriental studies were strenuously cultivated. Among the noted leaders were Erasmus, Melanchthon, Reuchlin, and Von Hutten. In the Netherlands and Flanders the new school of painting was a notable development. In France the movement had rich results in art and letters. Villon, Marot, Ronsard, but above all Rabelais are types of the French Renaissance in pure literature; while within the sphere of scholarship and religious reform are Scaligers, Dolet, Muretus, Cujacius, Salmasius, Casaubon, Beza, Calvin.

In England, Wyclif and Chaucer may be regarded as the forerunners of the Reformation and the Renaissance; but the main streams of both these movements reached England contemporaneously. In scholarship the great names are Grocyn, Linacre, Colet, Ascham, and More; but the fullest English outcome of the Renaissance was the glorious Elizabethan literature, with Spenser and Shakespeare, and in philosophy Bacon, as its most noted representatives.

RENAN, JOSEPH ERNEST (rē-na*ng*), a French writer; born in Tréguier, France, Feb. 27, 1823. He studied at the seminary of St. Sulpice, Paris, but in 1845 gave up all intention of becoming a priest and devoted himself to historical and linguistic studies, especially the study of Oriental languages. In 1848 he obtained the Volney prize for an essay on the Semitic languages. In 1849 he was sent by the Academy of Inscriptions and Belles Lettres on a mission to Italy, and in 1860 on a mission to Syria. In 1862 he was appointed Professor of Hebrew, Chaldee, and Syriac in the Collége de France, but the skeptical views manifested in his "Life of Jesus" (1863), raised an outcry against him, and he was removed from his chair, to be restored again, however, in 1871. This work, the publication of which caused intense excitement throughout Europe, was the first part of a comprehensive work on the "History of the Origins of Christianity," which includes

"The Apostles" (1866); "St. Paul" (1867); "The Antichrist" (1873); "The Gospels" (1877); "The Christian Church" (1879), and "Marcus Aurelius" (1880), all written from the standpoint of one who disbelieves in the supernatural claims of Christianity. Renan's latest important work is the "History of the People of Israel till the Time of King David." Other works are "General History and Comparative System of Semitic Languages," "Studies in Religious History," "Discourses and Lectures," several philosophical dramas, and his personal reminiscences called "Recollections of Childhood and Youth." He became a member of the French Academy in 1878. He died Oct. 2, 1892.

RENDSBURG, a town of Schleswig-Holstein, Prussia, on the North Sea and Baltic Canal, 19 miles W. of Kiel. Pop. about 20,000. Rendsburg was taken by the Imperialists in 1627; by the Swedes in 1643; and by the Prussians and confederate troops in 1848. The first diet of Schleswig and Holstein met there April 3, 1848. It was reoccupied by the Danes in 1852, and taken by the Prussians after a serious conflict July 21, 1864.

RENÉ, surnamed THE GOOD, Duke of Anjou, Count of Provence, and King of Sicily; born in Angers, France, Jan. 16, 1409; son of Louis II., Count of Anjou. He married in 1420 Isabella of Lorraine, but was driven from that duchy and kept prisoner by the Duke of Burgundy for several years. He succeeded his brother, Louis III., in 1434, and was chosen successor to the kingdom of Naples by Queen Joanna II.; was liberated in 1436, and was afterward engaged in war for three years with Alfonso of Aragon. Being unsuccessful in this conquest, René retired to Provence. His daughter Margaret was married, in 1445, to Henry VI. of England. On the seizure of Anjou by Louis XI. of France, in 1473, René retired to Aix, in Provence, where he died in 1480. His work on tournaments, and some of his poems and paintings, are still extant.

RENFREW, a town in Scotland, on the S. bank of the Clyde, 6 miles below Glasgow. Its charter of regality dates from 1396, but it was a burgh at least as early as the reign of David I. (1124–1153.) A knoll called Castlehill commemorates the site of Renfrew castle, the original seat of the royal house of Stewart. The principal industries are shipbuilding and weaving.

RENIERA, in zoölogy, the type-genus of *Renierinæ*, with 12 species. Sponges, easily crumbled, clump-like masses; canal system like that of *Halisarca*. Skeleton of four, five, or three sided, or polygonal meshes; spicules acerated, pointed, or rounded off, and connected by horny matter at their ends only. Distribution, probably world-wide.

RENIERINÆ, in zoölogy, a group including all sponges which resemble *Reniera* in having a skeleton formed of loose network of acerate or cylindrical spicules. Genera: *Amorphina*, *Pellina*, *Eumastia*, *Foliolina*, *Tedania*, *Schmidtia*, *Plicatella*, and *Auletta*. Distribution, world-wide.

RENNENKAMPF, PAUL K. VON, a Russian General; born in the Baltic provinces in 1854; received a military education, was commissioned and, by 1900, had risen to the rank of major-general. In the Russo-Japanese War (1904-1905) he acquired prominence as the commander of a division of Cossack cavalry. During the early part of the World War he commanded an army in East Prussia, but, being repeatedly defeated, was finally retired.

RENNES, the former capital of the province of Brittany, France, 234 miles W. S. W. of Paris. A seven days' fire in 1720 destroyed nearly 4,000 houses. Four bridges connect the upper or new town and the lower or old town, and the most noteworthy of the public buildings are the cathedral, finished in 1844, and Italian in style; Notre Dame, with its dome surmounted by a huge image of the Virgin; the archbishop's palace (1672); the stately court house (1618–1654); the university buildings (1855), with a picture gallery; the theater (1835); the Hôtel de Ville, with a public library; and the Lycée. As the focus of main and branch lines of railway between Paris and the N. W. of France, and commanding good river and canal navigation, Rennes is favorably situated for commerce. Its manufactures include sail cloth, table linen, etc. The second court-martial of Captain Dreyfus was held in Rennes during the summer of 1899. Pop. about 80,000.

RENNET, an aqueous infusion of the dried stomach of the calf. It is a valuable agent in the coagulation of the casein of milk preparatory to the manufacture of cheese. Also several sub-varieties of apple, with more or less spotted fruit; ground color gray, or golden. There is a French and a Canadian rennet; called also a queen.

RENNIE, GEORGE, an English civil engineer, eldest son of John Rennie; born in Surrey, England, Jan. 3, 1791; educated at St. Paul's School, London, and at Edinburgh University. In 1811

he became associated with his father in business, and on his father's death with his brother John. He constructed great naval works at Sebastopol, Nicolaiev, Odessa, Cronstadt, and in the principal ports of England, built several English and continental railways and was the author of important works on engineering. He died March 30, 1866.

RENNIE, JOHN, an English civil engineer; born in Phantassie, Scotland, June 7, 1761; educated at Dunbar and Edinburgh. He labored for some time as a workman in the employment of a millwright. He was afterward employed in London in the construction of machinery. Here his reputation rapidly increased, till he was regarded as standing at the head of the civil engineers of Great Britain. He built or designed numerous bridges, canals, docks, and harbors; among others, London Bridge across the Thames, the Crinan Canal, the Lancaster Canal, and the Avon and Kennet Canal; the London Docks, the East and West India Docks, and docks at Hull, Greenock, Leith, Liverpool, and Dublin; the harbors at Queensferry, Berwick, Howth, Holyhead, Kingstown, and Newhaven; and the government dockyards at Portsmouth, Chatham, Sheerness, and Plymouth. He died in London, Oct. 16, 1821.

RENO, a city of Nevada, the county-seat of Washoe co. It is on the Truckee river, and on the Southern Pacific, the Virginia and Truckee, and the Nevada, California, and Oregon railroads. It is also on the Truckee-Carson canal, a government irrigation project extending over 30 miles. It is the chief city of the State in industry, and contains railroad shops, reduction works, flour mills, and meat-packing houses. It is the seat of the Nevada State University, and has the United States Agricultural Experiment Station, the State Hospital for Mental Diseases, the Mackay School of Mines, a public library, Y. M. C. A. buildings, etc. Pop. (1910) 10,867; (1920) 12,016.

RENOIR, (PIERRE) AUGUSTE, a French figure and landscape painter; born in 1841, at Limoges. He began his artistic career by painting figures upon china and porcelain. After studying in Paris he became associated with the leaders of the modern impressionist school and in 1879 his works were exhibited in the Salon. He has devoted himself to the portraiture of women and children and his best work has been done in this field rather than in landscape painting. Among his best works are found "Young Girls at the Piano" (1888); "Female Torso" (1906); "Madame Charpentier and Her Children" (1878, Metropolitan Museum, New York); and the portraits of his contemporaries Monet and Sisley.

RENSSELAER, a city of New York, in Rensselaer co. It is on the Hudson river, directly opposite Albany, and on the New York Central and Hudson River and the Boston and Albany railroads. Its industries include the manufacture of ice tools, chains, dyes, medicines, clothing, furniture, lumber products, etc. It has the shops and freight yards of the Boston and Albany railroad. It has several parks and public buildings. Pop. (1910) 10,711; (1920) 10,823.

RENSSELAER POLYTECHNIC INSTITUTE, an engineering and scientific school located at Troy, N. Y. Founded by Stephen Van Rensselaer in 1824, the first engineering school that has had a continued existence to be founded in America. The old buildings were destroyed by fire in 1904, so that the present buildings are new, well arranged, and well equipped with modern apparatus. There are courses leading to degrees of Chemical Engineering, Mechanical Engineering, Civil Engineering and Electrical Engineering. Graduate degrees in these subjects are also given on the completion of advanced work. In 1919 the number of students enrolled registered 641, with a faculty of 60. Palmer C. Ricketts is the president of the institute.

RENT, a sum of money, or other valuable consideration, payable periodically for the use of lands or tenements; the return made to the owner by the occupier or user of any corporeal inheritance. It does not necessarily consist in money.

Adam Smith considers rent as the price paid for the use of land. Ricardo and his followers considered that the rent of superior soils is equal to the difference between their produce and that of the worst soils cultivated. There is great doubt as to the accuracy of this view. Land let by a landlord to a tenant for purpose of cultivation is analogous to money lent to a borrower. The rent of the land is virtually the interest on the land viewed as a loan. See SINGLE TAX.

RENUNCIATION, the act of renouncing a title; applied especially to the act of an executor, who, having been nominated in a will, and having the option of acting as such or not, declines to act, and in order to avoid any liability expressly renounces the office.

RENWICK, JAMES, the last of the martyrs of the Covenant; born in Mon-

iaive, Scotland, Feb. 15, 1662. He attended Edinburgh University with a view to the ministry, but was denied his degree, as he refused the oath of allegiance. He was chosen by the "Societies," as the bands of men devoted to the Covenant were called, to proceed to Holland to complete his studies in 1682, was ordained in 1683, and returned to Scotland. His life was now exposed to great hazards, and often reduced to great destitution. In 1684 he published his "Apologetic Declaration," for which he was outlawed. When James II. came to the throne in 1685 Renwick with 200 men went to Sanquhar, and published a declaration rejecting him. A reward was offered for his capture, he was hunted from place to place, and was at last captured in Edinburgh. He was condemned and executed Feb. 17, 1688.

REORGANIZED CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS, an ecclesiastical organization claiming to be the church of Latter-Day Saints established by Joseph Smith and associates at Fayette, New York, on April 6, 1830. Following the death of Smith the church left by him combined and fixed their headquarters at Zarahemla, Wis., in 1852, under the title given. They reenunciated the distinctive tenets enunciated by the founder and promulgated their creed in his words. The clause relating to marriage says that the church believes "that marriage is ordained of God and that the law of God provides for but one companion in wedlock, for either man or woman, except in cases of death or where the contract of marriage is broken by transgression." There has been much litigation between the Reorganized Church of Jesus Christ of Latter-Day Saints and the Mormons of Utah as to which organization is the true successor to the church founded by Joseph Smith and the courts have in every case sustained the former. It has now churches on almost every continent and a membership of about 75,000.

REPASSANT, in heraldry, a term applied when two lions or other animals are borne going contrary ways, one of which is passant, by walking toward the dexter side of the shield in the usual way, and the other repassant by going toward the sinister.

REPEAT, in music, a sign that a movement or part of a movement is to be twice performed. That which is to be repeated is generally included within dots in the spaces. When the performer does not, on repeating, go so far as the last dot sign, but finishes at a previous cadence, it is usual to write over the repeat, *Da Capo*, placing a pause and *Fine* over the chord at which the performer is to stop. See SEGNO.

REPEATER, in arithmetic, an indeterminate decimal in which the same figures continually recur or are repeated. In firearms, an arm which may be caused to fire several successive shots without reloading. In horology, a watch or clock made to strike the time when a spring is pushed in. Some strike the hour and quarters, others the hour, quarter, and odd minutes. In telegraphy the same as relay.

REPENTANCE, or **REPENTAUNCE**, the act of repenting; the state of being penitent; sorrow or regret for what has been done or left undone by one's self; especially sorrow and contrition for sin; such sorrow for the past as leads to amendment of life; penitence, contrition. (Matt. ix: 13).

Two kinds of repentance are recognized in the New Testament: "Repentance to salvation not to be repented of," which is characterized by "godly sorrow"; and repentance characterized by "the sorrow of the world that worketh death." (II Cor. vii: 9, 10).

REPLEVIN, a personal action which lies to recover possession of goods or chattels wrongfully taken or detained, upon giving security to try the right to them in a court of law, and to return them if the suit be determined against the plaintiff. Originally a remedy peculiar to cases of wrongful distress, it is now applicable to all cases of wrongful taking or detention. Also the writ by which goods and chattels are replevined.

REPLICA, in the fine arts, the copy of a picture, etc., made by the artist who executed the original.

REPORTING, an important branch of journalism; the act, system, or practice of making reports of meetings, debates, or the like. Accounts of single speeches, and at times of entire debates in the English Parliament, having come down to us from a very early period. Sir Symonds d'Ewes edited the "Journals of Queen Elizabeth's Parliaments," and the Commons "Journals" contain notes of speeches in the Parliaments of James I. Rushworth, assistant clerk in the Long Parliament, 1640, took down in a species of shorthand any speech of importance; and his account of "Remarkable Proceedings in Five Parliaments" forms one of the most valuable portions of his "Historical Collections." In the reign of Queen Anne, a monthly pamphlet, called the "Political State," gave an outline of the debates in Parliament. In

the reign of George I. the "Historical Register," published annually, professed to give reports of parliamentary speeches. The "Gentleman's Magazine" began a monthly publication of the debates August, 1735.

The Commons in 1588, and the Lords in 1698, passed resolutions declaring such publications a breach of privilege and that offenders would be severely punished. The reports, notwithstanding, still appeared, but under the disguise of "Debates in the Senate of Lilliput," in the "Gentleman's Magazine," and "Debates in the Political Club," in the "London Magazine." Dr. Samuel Johnson was employed by Cave, publisher of the "Gentleman's Magazine," in the composition of his parliamentary debates, and the reports from 1740 to 1743 are held to have been entirely prepared by him. It was not till 30 years later that the parliamentary debates descended from the magazines to the newspapers.

The ever-memorable contest between Parliament and the press began at the close of the year 1770. The House of Commons followed up another solemn threat by prompt action; and the Lord Mayor of London and Alderman Oliver were sent to the Tower for refusing to arrest some printers of reports on the warrant of the Speaker, John Wilkes taking an active share in the controversy. The city of London loudly protested against the arbitrary proceedings of the House, and the whole country responded to the appeal. The power of Parliament to imprison ceased at the end of the current session, and on the day of prorogation, July 23, the Lord Mayor and Alderman Oliver marched out of the Tower in triumph, and at night the city was illuminated. In the next session the House of Commons tacitly acknowledged itself beaten. The printers defied the House, continued to publish their proceedings, and slept, notwithstanding, secure in their beds. In a short time the House of Lords also conceded the point, and the victory was complete; though it is still in the power of any member, who may call the Speaker's attention to the fact that "strangers are present," to exclude the public and reporters from the House.

The old machinery of newspaper reporting was susceptible of immense improvement. One of the Woodfalls (a brother of the Woodfall of Junius) had so retentive a memory that when editor of the "Morning Chronicle," he used to listen to a debate in the gallery, and write it out next day, the taking of notes being at that time forbidden. His successor established a corps of parliamentary reporters to attend the debates of both Houses every night in succession. He thus brought out the night's debate on the following morning, anticipating his rivals by 10 or 12 hours. The improvement in the reports of the debates from the period of the American Revolution till the year 1815 was but gradual. At the close of the French war, however, the publication of parliamentary debates became an object of national importance, and in the course of a few years assumed its present full, detailed, and accurate character. Increased facilities for the discharge of their important and arduous duties were from time to time given to the reporters, who till then had no means of entering the Stranger's Gallery except those which were common to the public generally. Among the professional parliamentary reporters of this period Charles Dickens was conspicuous. He was at work for the "Morning Chronicle" in 1834, and was one of the best reporters of his time.

The system of parliamentary reporting underwent a change of great importance about 1847, when the electric telegraph was brought into general use by companies formed to work it. They proposed to supply papers out of London with London news, and a report of parliamentary debates was part of the news thus supplied. In order to get this report the telegraph company obtained admission to the gallery for its reporters, and thus broke the monopoly which the London daily newspapers had up to that time enjoyed.

The methods of newspaper reporting in the United States have been developed to a degree of the greatest efficiency. It is usual for the reporter to be a proficient in the art of stenography as well as in that of mere literary composition. Further than this, in some of the large cities the reporter must also be an operator on a typewriting machine, in order that his "copy" may go to the compositor in its most legible shape. The rapidity with which reports of speeches, meetings, notable incidents, etc., are furnished to the press is something almost incredible to the uninitiated. The various press associations of the country are the principal factors in the work of disseminating the results of reportorial work, and greatly facilitate the interchange of intelligence between distant points.

REPOUSSÉ, a term applied to a kind of ornamental metal work, formed in relief by striking on the metal from behind with a punch or hammer till the required forms are roughly produced in relief on the surface; the work is then finished by the process of chasing. The work of

Benvenuto Cellini (1500–1570), in this branch of art, is the most celebrated. Common work of this kind, as for tea or coffee pots, is executed in pewter and Britannia metal, and then electrotyped.

This art, as practiced by the silversmith and artist, is almost entirely dependent on the manual dexterity of the operator. The kind of repoussé here suggested depends more on appliances than skill. It is not, however, assumed that any set of devices can be made to serve in lieu of taste and judgment.

To carry out this method, a piece of heavy cotton lace, or heavy openwork fabric, or a piece of a basket may be glued to a block of hard wood to serve as a sort of die for producing the impression in the metal. The fabric or basket work is not only attached to the block by means of glue, but its finer interstices are filled with glue, so as to present a surface resembling the original fabric only in the most general way. When the glue is perfectly dry and hard, the die is laid on a solid foundation, and a piece of very thin, soft copper or brass is secured to the block so as to cover the lace. A piece of cork about one-quarter inch thick and about three inches wide and six or eight inches long is laid over the metal, and struck with a mallet. The cork yields sufficiently to push the metal down on the die, and cause it to take the pattern of the lace or whatever is used in forming the die. A piece of rather hard rubber packing will answer this purpose in nearly all respects as well as the cork.

Designs may be cut from strong paper or pasteboard and glued to the block, or a stencil design may be sawed from hard wood. The lines and scrolls are discontinued in places, so as to cause the wood to hold together. If it is desired to render the lines continuous at these points, they may be run through with a V-tool. Dots are picked out with a small gouge or with the point of a revolving drill. In all these cases the metal is attached to the block and treated as above.

Either panels or continuous strips may be embossed in the manner described, and these are to be used in making frames, vases, and various ornamental objects. If the metal is too thin for a certain case, it may be strengthened by flowing soft solder over the back of the plate by means of a soldering iron. As to finish, any of the several well known methods of oxidizing or lacquering may be employed.

Bas-reliefs may easily be made by a method which is a modification of the one described.

To a wooden frame is fitted a board, on which is drawn in outline the sign which is to be produced in relief. The board may be of pine or any close-grained, soft wood for lead work; but for brass or copper, the wood should be hard. To the frame is attached the plate of metal by means of screws. The board is removed from the frame, and the portion of the design which is to form the most prominent feature of the relief is sawed out of the board, when the latter is replaced in the frame, and the metal is forced into the opening of the board by pressing on the surface of the lead opposite the hole in the board, or by pounding it by means of the mallet. As soon as this feature is complete, the next in order is sawed out of the board, and the operation is repeated till all of the general features are developed. The progress of the work can be observed at any time by removing the board.

The features may be corrected or modified by working from either side of the plate by means of the convex mallet and the wooden punches and chisels. If a support is desired for any part while the work is progressing, a stout bag filled with sand may be placed under the part. A few very small bags, say 1 inch or 1½ inches in diameter, will be found convenient. If desired, the drapery of the background may be chased by means of hard wood or metal punches, bearing the desired figures.

The relief, if of lead, looks well with an antique finish. This may be secured by rubbing the prominent portions of the relief with fine emery cloth, then going over the entire surface with a swab formed of a small roll of cotton cloth encircled by a coil of copper wire, the swab being dipped in dilute nitric acid before application to the relief.

The copper is dissolved and deposited on the bright prominent portions, while a dark deposit is made in the hollows, which when dry has a green tinge.

To give the work the appearance of antique iron the surface may be blackened by the application of a solution of sulphuret of potassium and the prominent portions may be semi-polished by briskly rubbing the entire surface with a piece of canvas or Brussels carpet.

REPPLIER, AGNES, an American essayist; born in Philadelphia in 1859. Her published works include: "Books and Men"; "Points of View"; "In the Dozy Hours"; "Essays in Idleness"; "Essays in Miniature"; "Varia"; and "Philadelphia: the Place and the People." She also compiled a "Book of Famous Verse," "Americans and Others" and "The Cat" (1912).

REPRESENTATIVE GOVERNMENT, that form of government in which either the whole of a nation, or that portion of it whose superior intelligence affords a sufficient guarantee for the proper exercise of the privilege, is called on to elect representatives or deputies charged with the power of controlling the public expenditure, imposing taxes, and assisting the executive in the framing of laws. See CONSTITUTION.

REPRESENTATIVES, HOUSE OF, one of the branches of the Congress, also known as the Lower House and the Popular House. The members of this branch are elected directly by popular vote. In it is vested by the National Constitution the sole right to originate laws concerning the finances of the country. The Committee on Ways and Means of the House is the original source of all tariff legislation, and all bills providing for the raising or expenditure of public moneys have their origin in the House. In each of these two forms of legislation the House has the limited co-operation of the Senate, viz., the Senate may amend a tariff bill or resolution appropriating public moneys in the line either of increasing or decreasing specific amounts. The House has the privilege of passing on these Senate amendments, and if it declines to accept any part of such changes, it is customary to appoint a Conference Committee consisting of an equal number of members from the House and Senate, to whom the disputed subject is referred, and the report of this committee is generally accepted in the light of a compromise by both houses. The membership of the House is based on the population of the country as ascertained decennially by the census, and therefore changes every 10 years.

REPRIEVE, the suspension or delay of the carrying out of a sentence (generally of death) on a prisoner. It is popularly but erroneously supposed to signify a permanent remission, or commutation of a capital sentence.

REPRISE, in maritime law, a ship recaptured from an enemy or pirate. If recaptured within 24 hours of her capture she must be restored to her owners in whole; if after that period, she is the lawful prize of her recaptors.

REPRODUCTION, the term applied to the whole process whereby life is continued from generation to generation. One of the characteristics of life is its continuity; the races of animals and the orders of plants live on without marked change for centuries; by slow modifications they may be enriched or impoverished, increased or thinned, but there is no breach of continuity. All the forms of life seem to evolutionists like twigs on one many-branched tree; they are genetically related by near or distant bonds of kinship, and in a very real sense each generation is continuous with those which come before and after it.

Modes of Reproduction.—Separated fragments of a sponge or cuttings from the rose, the buds of a hydra, or the bulbils of a lily, the eggs of a bird, and the seeds of plants are alike able to grow into new organisms; and thus we see that the common fact about all kinds of reproduction is that parts of one organism are separated to form or to help to form new lives. In many cases what is separated from the parent life is simply part of its body, an overgrowth or a definite bud, which, being set free, is able to reproduce the whole of which it is a representative sample. This is called asexual reproduction. In most cases, however, the parents give origin to special reproductive elements—egg cells and male cells—which combine and are together able to grow into a new life. This is called sexual reproduction.

The simplest forms of reproduction are found among the single-celled plants and animals. There we may find an organism like Schizogenes, multiplying by breakage, reproducing by rupture, presumably when the cell has overgrown its normal size; in others numerous buds are liberated at once, as in Arcella and Pelomyxa; in many, familiarly in the yeast plant, one bud is formed at a time; in most the cell divides into two or many daughter cells. The cast-off arm of a starfish may regrow the entire animal with a readiness that suggests a habit; some kinds of worms (*e. g.*, Nemerteans) break into pieces, each of which is able to regrow the whole; large pieces of a sea anemone or of a sponge are sometimes separated off and form new organisms.

But the usual mode of asexual reproduction is by the formation of definite buds. When these buds remain continuous, colonial organisms result, like many sponges, most hydroids, Siphonophora like the Portuguese man-of-war, many corals, almost all the Polyzoa, and many Tunicates. The runners of a strawberry and the suckers which grow around a rose bush illustrate the same state. But in a few plants, like the liverwort and the tiger lily, a kind of bud may be detached, and thus begin a new life. It is among animals, however, that the liberation of buds is best illustrated, for this mode of reproduction occurs in hydra and many hydroids, in some "worms," and in Polyzoa, and even in animals as highly organized as Tunicates. Budding is

usually exhibited by comparatively simple and by sedentary animals, and seems indeed to be natural to vegetative organisms. Budding is only possible when the organism is not very highly differentiated, or when part of the body retains many indifferent units; moreover, it is an expensive way of securing the continuance of generation, and is without the advantage to the species which undoubtedly results from the mingling of two life-currents in sexual reproducton.

Sexual reproduction in its fully differentiated form involves (a) the distinctness of two parent organisms, (b) the formation of two different kinds of reproductive elements — *e. g.* spermatozoa produced by the male and ova by the female, and (c) the fertilization of the egg cell by a male element. Moreover the process of sexual reproduction also includes the sexual union of the two parents, or other ways in which fertilization is secured, while in some cases the fertilized ovum develops in organic relation with the mother organism, from which it is eventually separated as an embryo.

Physiology of Reproduction. — All growth is, in a certain sense, of the nature of reproduction. It is an increase in the amount of protoplasm and its attendant train of substances. Abundance of food material and conditions favorable to rapid assimilation are necessarily accompanied by rapidity of growth; but in the most favoring circumstances there is an inevitable limit to the growth in size of a single cell. It occurs when the rate of assimilation of the constantly increasing mass of protoplasm becomes equal to the highest possible rate of absorption. Since absorption can only take place through the surfaces, and since, with any given figure of cell, the ratio of volume to surface is a perfectly definite rate as the cell grows, there must be for any given figure of cell a perfectly definite limit of size. For any mass of cells arranged in any manner there must be, for similar reasons (though other factors, such as weight, etc., may be operative and varyingly important), a definite limit of size. When in the single-celled animals this limit is reached, or is nearly reached so that starvation begins —and in any case the greater the size of the cell the less rapid, in proportion to volume, must be the absorption, unless at a certain point other factors at present unknown occur—then division of the cell takes place, by which means, the volume remaining the same, the surface is doubled, so that the ratio of volume to surface and therefore of assimilation to absorption is lowered, and growth is once more possible. This law (first clearly stated by Spencer and by Leuckart) is evidently the expression of a factor concerned in the initiation of cell division and therefore of the Metazoa, or many-celled animals. In the Protozoa, then, reproduction is related to, and in a certain sense caused by, a diminution in the possible rate of assimilation, which, to the protoplasm concerned, bears the aspect of an impaired nutrition. In the Metazoa, though reproduction is not so entirely a mere process of cell division as in the Protozoa, a connection between nutrition and reproduction is observable. The common hydra, with an abundant food supply and favoring circumstance, grows rapidly, the growth becoming a process of asexual reproduction and taking the form of the production of numerous buds, which may themselves produce a crop of secondary buds. But if the conditions become less favorable to nutrition through the lessening of the supply of food material, then this rapid growth ceases and reproductive organs are formed and sexual reproduction takes place.

Fruit trees are root-pruned in order that the crop of fruit may be abundant; the reason being that, as nutrition is lessened by such pruning, there follows an increase of reproductive activity which takes the form of fruit. If the vegetative activity of the plant be what one desires, then the flower buds are nipped off and sexual activity prevented. A similar result follows from the castration of animals. Other factors than the supply of food matter influence assimilation and reproduction. As in the case of all molecular movements, variations of temperature are an obvious cause of change of state.

Reproductive maturity—the blossoming of the individual life—occurs, as has been shown, about the time when growth ceases. In the lower animals sexual maturity is attained relatively sooner than in the higher forms; but there are many strange cases of precocious and retarded reproduction. Thus we may contrast our common annuals and the "century plant" or American aloe, or some midges, worms, and even a couple of amphibians, which are reproductive during larval life, with highly evolved animals, such as the elephants.

But, while reproduction is a blossoming of the individual life, it is also in a sense the beginning of death. The flower and fruit often end the life of the plant. It may be that the processes of rupture by which some of the simplest organisms reduce their bulk and multiply their kind are but a few steps from the more diffuse dissolution of death. It is a fact that in some simple animals—*e. g.* some

"worms"—the parent, and especially the mother, ruptures and dies in liberating the reproductive elements. So, among higher forms, not a few insects—mayflies, locusts, butterflies—die a few hours after reproduction. The exhaustion is fatal, and the males are sometimes victims as well as their mates. In higher organisms the fatality of the reproductive sacrifice has been greatly lessened, yet death may tragically occur, even in human life, as the direct nemesis of reproduction. In short, the process by which new lives begin, by which the continued life of the species is secured, tends to be antagonistic to the life of the parent individuals. The old leaves fall off the tree, and their places are filled by others.

Rate of Reproduction and Increase.—The rate of reproduction depends on the constitution of the individual organism and on its immediate environment and nutrition. The rate of increase, which is much more difficult to estimate, depends on the wide and complex conditions of life which are often included in the phrase "the struggle for existence." While it is true that organisms sometimes exhibit an extraordinary increase in numbers in favorable areas and seasons, and while we know of many forms and even of whole races which have dwindled away and become extinct, the fluctuations in the numbers of plants and animals seem for the most part to be imperceptibly gradual. Their rate of reproduction is adjusted to the conditions of their life; the rise or fall of the population is seldom emphatic. The essay of Malthus (1798), in which he showed that the increase of human population tended to outrun the means of subsistence, but was met by various checks, afforded suggestions to Darwin and Wallace, who extended the induction of Malthus to plants and animals, recognizing in their increase the fundamental condition of the struggle for existence, and analyzing the checks as various forms of natural selection. But Herbert Spencer's analysis of the laws of multiplication was even more penetrating. Including under the term individuation all those race-preservative processes by which individual life is completed and maintained, and under the term genesis all those processes aiding the formation and perfecting of new individuals, he showed both inductively and deductively that individuation and genesis vary inversely. Genesis decreases as individuation increases, but not quite so fast; in other words, progressive evolution in the direction of individuation is associated with a diminishing rate of reproduction.

Importance of Reproduction in Evolution.—As almost every individual life begins in the intimate union of two living units—the male cell and the egg cell—there is in the nature of the organisms beginning an evident possibility of variation. The two cells, and more especially, the nuclei of the two cells, are intermingled; and in the vital combination which results new characteristics may be evolved, old features may be strengthened, peculiarities may be averaged off. On fertilization as a source of variation, emphasis has been laid by Treviranus, Galton, Brooks, and others, while Hatschek regards the intermingling as an important counteractive of disadvantageous individual peculiarities, and Weismann finds in it the sole source of transmissible variations in many-celled animals.

In the individual life the antithesis between the reproductive and the nutritive functions has many expressions, and in terms of this antithesis not a few lines of variations can be rationalized. Thus, the shortening of the axis of the flower seems to be the result of a check imposed on the vegetative system by the reproduction function; thus, the development of gymnosperm into angiosperm suggests a continuous subordination of the reproductive carpellary leaf; thus, in almost every natural alliance of phanerogams may be read a contrast between more and less vegetative types, such as is seen within the limits of a single species in the transitions between the leafy kale and the cauliflower. Among animals the antithesis is expressed in different ways—as in the varied degree in which the reproductive individuals of a hydroid colony are differentiated from the nutritive members.

In considering the evolution of animals great importance is always—and rightly—attached to the self-preserving struggles and endeavors which secure the satisfaction of nutritive needs; but the species maintaining activities of reproduction have been not less important. Thus, Darwin insisted on the importance of sexual selection as a factor in evolution, and, though the criticisms of Wallace and others have lessened the cogency of Darwin's argument, there can be little doubt that courtship has aided in the evolution of the psychical life of animals. Romanes, too, in his insistence on the importance of isolation, recognizes "the reproductive factor in evolution." For by variations in the reproductive system a species may be divided into mutually sterile sets, which, prevented from intercrossing by this physiological barrier, are free to develop along divergent paths.

The increase of reproductive sacrifice

which is observed in the evolution of mammals and in the progress through oviparous monotremes, prematurely-bearing marsupials, and various grades of placentals; the growth of parental care, and the frequent subordination of self-preserving to species-maintaining ends; and finally, the rise of sociality from foundations based in organic kinship, are well-known facts of animal life which suggest the importance of the reproductive factor in evolution.

REPTILIA, reptiles; cold-blooded, oviparous, or ovoviviparous, vertebrate animals having the skin covered with scales or scutes; heart with two auricles, ventricular chamber incompletely divided. Respiration takes place by lungs, respiratory movements being slow and irregular. Intestinal tract and urogenital organs open into a common cloaca. Aristotle was the first naturalist who wrote on reptiles. Some progress in classification was made by Ray (1628–1705) and Linnæus (1707–1778). Brongniart, in 1799, first recognized the characteristics by which the Batrachia differ from other reptiles and form a natural passage to the fishes. In 1863 in his Hunterian Lectures, Huxley adopted the term Sauroids for that division of the vertebrates which he afterward called Sauropsida. He divides the Reptilia into the following orders: *Chelonia, Plesiosauria, Lacertilia, Ophidia, Ichthyosauria, Crocodilia, Dicynodontia, Ornithoscelida,* and *Pterosauria.* Owen makes reptiles proper the highest of the five sub-classes into which he finally divided his Hæmatocrya with orders:

Ichthyopterygia (extinct), *Sauropterygia* (extinct), *Anomodontia* (extinct), *Chelonia, Lacertilia* (with the extinct *Mosasaurus*), *Ophidia, Crocodilia* (with the extinct *Teleosaurus* and *Strepsospondylus*), *Dinosauria* (extinct), and *Pterosauria* (extinct).

Professor Mivart divides the Reptilia into the following orders:

Ichthyopterygia (extinct), *Anomodontia* (extinct), *Dinosauria* (extinct), *Ornithosauria* (extinct), *Crocodilia, Rhynchocephalia, Sauropterygia, Lacertilia, Ophidia,* and *Chelonia.*

The first appearance of reptiles is believed to be indicated by remains of a marine Saurian (*Eosaurus acadianus*) of Carboniferous age. Proterosaurus is found in the Permian. In Mesozoic times the reptilian type appears in such variety and in such a high state of development that this era has been distinguished as the Reptilian Age. In the Trias large marine Saurians and Dinosaurs are met with; more gigantic forms were developed in the Jurassic period; and the class attained its highest culmination in the Chalk.

REPTON, a village of Derbyshire, England. Here was founded the first Christian church in Mercia, of which Repton for a while was the royal and episcopal capital. It was the seat from before 660 till its destruction by the Danes in 874 of a celebrated nunnery, as afterward of an Austin priory from 1172 till the Dissolution. Remains of this priory are incorporated in the buildings of the free grammar school, which, founded in 1556 by Sir John Porte, has risen to be one of the great English public schools.

REPUBLIC, a commonwealth; a form of political constitution in which the supreme power is vested, not in a hereditary ruler, but in the hands either of certain privileged members of the community or of the whole community.

REPUBLICAN PARTY, one of the two great political parties in the United States. The term Republican has had at different times different significations. In 1792 a faction of the Anti-Federalists, advocating more direct control of the government by the people, further restriction of supreme authority, and a stronger emphasis of States Rights, began to be known as the Republican party. This party was increased by numbers of voters who called themselves Democrats on account of their sympathy with the French Jacobins. The combination was known officially as the Democratic-Republican party. Those members having centralizing tendencies having seceded, the term Democratic was alone retained. This name, as the title of a National party was first used in 1825, the election of 1828 being the first in which it appeared, at that time opposing the original holders of the name. The name Republican, as the title of a party went out of use after the election of 1824, but was resumed in 1856, during the administration of Mr. Pierce (1853–1857). Its platform rested mainly on the prohibition of slavery in the Territories, declaring that freedom was the public law of the national domain; the prohibition of polygamy, which it classed with slavery as "the twin relic of barbarism"; and the admission of Kansas as a free State. In 1856 the party fairly divided the country with its Democratic competitor. In June of that year its convention met at Philadelphia and nominated John C. Fremont for President. But the American party drew something from its strength, and though showing a popular vote of 1,341,264, it was defeated, the slave States, with the exception of Maryland, which voted for Mr. Fillmore, going solidly for Mr. Buchanan, the Democratic candidate, who was elected with the aid of five free States, 11 of the latter voting for General Fremont. The decision

in the Dred Scott Case and the progress of events in Kansas greatly strengthened the party, and after the divisions among the Democrats over the same question in 1860 the success of the Republicans was assured. In 1860 the party elected Abraham Lincoln President. The sectional issue was still more strongly marked and he received the electoral votes of the free States except New Jersey, which gave three votes to Mr. Douglas. On the announcement of his election the Southern States prepared to secede, South Carolina leading, followed by 10 others. Mr. Lincoln was inaugurated March 4, 1861, General Scott carefully supervising the ceremony. He asserted that there was no right to interfere with slavery in the States where it existed, and acknowledged that of the reclamation of fugitive slaves; but he expressed his determination to execute the laws and protect public property. The conduct of the Civil War was in the hands of the Republican party, though northern Democrats formed a large proportion of the Union army.

In 1864 Mr. Lincoln was unanimously nominated by the Republicans, and was re-elected by an overwhelming majority. The war was brought to a close by the surrender of General Lee, April 9, 1865; on the 14th Mr. Lincoln was assassinated, and died the next day. Andrew Johnson, the Vice-President, immediately succeeded him, and continued his cabinet. Mr. Johnson had been a loyal Union man of Tennessee and was chosen in view of the reconstruction of the South. He soon disagreed with the party and came into actual conflict with Congress. He was impeached March 23, 1868, but acquitted May 16 and 26 for lack of one of two-thirds for conviction. Chief-Justice Chase presided at this trial. In 1868 Ulysses S. Grant was elected President. His election was urged on the ground that the Republican party, having successfully finished the war, maintained public credit, abolished slavery, and secured liberty, was the proper one to carry on the government. In May, 1872, the Liberal Republicans met in Cincinnati, and nominated Horace Greeley, which action was indorsed by the Democratic convention. The Republicans nominated General Grant, and re-elected him by a larger vote than that of the former term. In 1876 Rutherford B. Hayes, by the decision of the Presidential Electoral Commission, was declared elected. During this administration the resumption of specie payments took place, Jan. 1, 1879, and the reconstruction of the South went forward. In 1880 James A. Garfield was elected president, and died Sept. 19, 1881, from wounds inflicted July 2, and Chester A. Arthur, the Vice-President, took his place. In 1884 there arose a considerable defection from the party ranks, the seceders calling themselves Independent Republicans, and declining to vote for James G. Blaine, the regular nominee. As a result Grover Cleveland, the Democratic candidate, was chosen. In 1888 the party again triumphed in the National election, Benjamin Harrison defeating Grover Cleveland on the tariff issue. During this administration, largely by the diplomacy of Mr. Blaine, Secretary of State, reciprocity trade relations were established with five South American States, with Austria-Hungary, Spain and Great Britain (as to British Guiana, and some of the British West India islands), admitting certain articles free of duty for the mutual advantage of these States and the United States. A new tariff bill, known as the McKinley bill, was passed favoring protection. A brief protectorate was assumed by the United States minister to Hawaii over the islands (see HAWAII). In 1892 the party was defeated by the second election of Grover Cleveland and a Democratic Congress. In 1894 it again came into power in Congress by signal majorities carrying even Kentucky and other Democratic strongholds; and in 1896 regained all branches of the Government by the election of William McKinley and an increased majority of Congress. In 1899 the Republican party held the governorship in 26 States, and controlled the legislature in 22, with a plurality in several others. In 1900 President McKinley was re-elected, his first administration having been marked by a general business prosperity, and the successful waging of the war against Spain, "in the interest of humanity." On the death of President McKinley, from an assassin's bullet, Sept. 14, 1901, his place was filled by Theodore Roosevelt, Vice-President. Elected President 1904.

The Panama Canal was begun in his administration, and completed in the Taft administration that followed. In 1912, Taft and Sherman ran for re-election, Roosevelt and Hiram Johnson heading the Progressives. Taft only carried Vermont and Utah. Roosevelt received 88 electoral votes. Woodrow Wilson became President; was re-elected in 1916, running against Charles E. Hughes, Republican. On March 4, 1919, the Republicans gained control of the Senate and House. The Republican victory, on Nov. 4, 1920, gave the entire control of the Government to the Republican party.

REPUDIATION, an unprincipled method for the extinguishment of

a debt, by simply refusing to acknowledge the obligation. The 11th amendment of the Constitution of the United States prohibits citizens of another or a foreign State from bringing suits against a State in the federal courts; while the individual States, not being independent sovereigns, could only be called to account by a foreign power through the National Government. Reprisals or war are thus as impossible as a suit at law, and there is really no means by which the States can be compelled to recognize and meet their obligations. Twice in the history of the country have several States taken advantage of this condition of affairs—once after the commercial crisis of 1839, in which the United States Bank stopped payment, and again in the years following the Civil War. In the latter period Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas were among the defaulters. Virginia, indeed, refused payment chiefly on the ground that no part of its existing debt had been allocated to West Virginia when the latter was separated as a State in 1863; and later acts of repudiation found a local justification in the same grievance.

REPULSION, in physics, the force which compels certain bodies or their particles to recede from each other. No repulsion exists between bodies at sensible distances, except when they are in certain electric or magnetic states, in which case the repulsions between them are in the inverse ratio of the square of the distance. At insensible distances, some influence keeps the particles of a body from being in absolute contact, whence results the phenomenon of elasticity. The motions produced by heat are also a cause of strong molecular repulsion. The molecules of gases are always in a state of mutual repulsion.

REPUTED OWNER, in law, one who has to all appearance the actual possession and ownership of property. When a reputed owner becomes bankrupt, all goods and chattels in his possession may in general, with the consent of the true owner, be claimed by the trustee for the benefit of the creditors.

REQUIEM, in the Roman Catholic Church, a solemn musical mass for the dead, which begins in Latin, "*Requiem æternam dona eis*," etc., "Give to them eternal rest," etc. Mozart, Jomelli, and Cherubini composed famous requiems.

REREDOS, the screen at the back of an altar. Also the screen in front of the choir, on which the rood was displayed, and the wall or screen at the back of a seat. An open hearth, upon which fires were lighted immediately under the louvre.

RESACA DE LA PALMA, a ravine in Cameron co., Tex., where on May 9, 1846, the United States troops under Taylor defeated the Mexicans under General Arista, and opened the way to Matamoros.

RESCRIPTS, answers of the Popes and emperors to questions in jurisprudence officially propounded to them. *Rescripta principis* (rescripts of the prince) were one of the authoritative sources of the civil law, and consisted of the answers of the emperor to those who consulted him, either as public functionaries or as individuals, on questions of law. They were often applied for by private persons, more especially women and soldiers, to solve their doubts or grant them privileges. The rescripts directed to corporate and municipal bodies were known as *pragmaticæ sanctiones*, a name which has found its way into the public law of Europe.

RESCUE, in law, is the forcibly and knowingly freeing another from an arrest or imprisonment; and it is generally the same offense in the stranger so rescuing, as it would have been in a jailer to have voluntarily permitted an escape.

RESECTION, in surgery, the operation of cutting out the diseased parts of a bone at a joint. It frequently obviates the necessity of amputating the whole limb, and, by the removal of the dead parts, leaves the patient a limb which, though shortened, is in the majority of cases better than an artificial one. Resection, which is one of the triumphs of modern surgery, was performed as early as 1762.

RESEDA, the mignonette; the typical genus of *Resedaceæ;* from Europe and western Asia; known species, 26. One species, *R. phyteuma*, is eaten as a kitchen plant in Greece. *R. odorata* is the mignonette. *R. luteola* yields a yellow dye.

RESERVATION, in the United States, a tract of the public land reserved for some special use, such as Indian tribes, national parks, notable battlefields, large military cemeteries, etc.

RESERVATION, PAPAL, the privilege, introduced by John XXII. and continued by Clement VI. and Gregory XI., of reserving to the Holy See the power of electing bishops, formerly possessed by the clergy and people of the several cities. Reservations were abolished by the Council of Constance, March 25, 1436.

RESERVE, in military usage, a body of troops kept for any emergency; that portion of an army drawn up for battle which is reserved to support the other lines as occasion requires. In Europe the term includes those soldiers who, after having enlisted for a certain period of service, have been a certain time in the army, and then have been passed into the reserve, in which they are at any time liable to be recalled to service till their full period of enlistment has expired. (See ARMY.) A magazine of warlike stores situated between an army and its base of operations.

RESERVE BANKS, FEDERAL, a system of Government banks to act as a stabilizing influence on private banking institutions during periods of financial disturbances. The discussion of Government support of private financial institutions came as a result of the financial panic of 1907, when through the popular distrust of depositors hundreds of private banks were forced into the hands of receivers, not through lack of a sound economic basis, but through inability to liquidate their assets in time to meet the runs of depositors, clamoring for their funds. The idea behind the Federal Reserve Bank was to give confidence to the people in the private banks by placing the financial strength of the Government behind them, thus assuring the depositors of the financial safety of their savings.

The Federal Reserve bank was established by an Act of Congress, finally passed on Dec. 23, 1913. By this law the country was divided into Reserve Bank districts, in each of which was established a reserve bank. One was placed in each of the following centers: Boston, Mass., New York City, Philadelphia, Cleveland, Richmond, Va., Atlanta, Ga., Chicago, St. Louis, Minneapolis, Kansas City, Dallas, Tex., and San Francisco. Each of these acts as a depository for the national banks of its district, each of which subscribes stock to the extent of six per cent. of its paid-up capital and surplus. State banks also have the privilege of becoming participants in the plan, provided that they are willing to submit to certain conditions imposed as to the amount of their reserves, etc.

Each Federal Reserve district bank is governed by nine directors; three representing the national banks of the district, three representing agriculture, industry and commerce in general, and the rest representing the Government, being appointed by the Federal Reserve Bank Board, in Washington, D. C. This latter body controls the whole system and consists of the Secretary of the United States Treasury, the Comptroller of Currency, ex-officio, and five members who are appointed by the President, subject to the approval of the Senate.

The functions of the Board are to so mobilize the finances of the country as to act as a reserve in any part of the country where private banks may be threatened by a panic. The very existence of the system, however, acts as a deterrent on any such threat. This is done through the Secretary of the Treasury, who has the power to place Government gold reserves at the disposal of any of the district centers, where the national banks may quickly realize on their long-time securities or investments by borrowing from the reserve banks. Aside from this, any individual bank in temporary difficulties on account of a sudden run of depositors is able to utilize the reserves of other banks, through the district bank, and is in no danger of being tied up with long-time notes or mortgages, on which the loans may be quickly made. Through the reserve banks, also, the practice of REDISCOUNTING (*q. v.*), so common a practice in European countries, is in this country becoming more common, and banks are able to utilize the capital sunk in negotiable instruments by utilizing them as a form of currency. National banks participating in the plan are also able to issue notes on their gold reserves to the extent of 40 per cent.

On Oct. 17, 1919, a report of the Board in Washington showed the financial condition of the Federal Reserve Bank to be as following:

Gold reserves	$2,128,000,000
Capital paid in	85,000,000
Government deposits	133,000,000
Total gross deposits	2,958,000,000
Total resources	6,161,000,000

Federal Reserve Bank notes in circulation amounted to $2,752,000,000, and notes issued by the participating national banks amounted to $249,000,000.

RESERVOIR, an artificial basin in which a large quantity of water is stored. A vast system of reservoirs, called "tanks," exists in India, constructed for purposes of irrigation. The reservoirs on the irrigation canals of Spain are all of masonry; they are circular or polygonal in shape, and the interior face of the wall, which is constructed of large ashlars, is vertical. In France, Italy, and particularly in England, the preference is given to earthen dams. See DAM.

RESHT, or **RESHD**, a town of Persia; capital of the province of Ghilan, standing near the S. W. shore of the Caspian Sea, 150 miles N. W. of Teheran. Silk is grown and manufactured; and rice and tobacco are cultivated. The port of the

place is Enzeli, on the other side of the bay, and 16 miles distant. Pop. between 30,000 and 40,000.

RESIDENCE. The length of time which a person shall remain within the limits of a state in order to give him a legal residence there, varies in the different commonwealths, each government being the judge of the qualifications necessary to entitle a denizen to claim permanent residence within its boundaries. An alien who desires to become a naturalized citizen of the United States must prove a residence of five years in the country previous to admittance to the rights of adoption.

RESIDUARY LEGATEE, the legatee to whom is bequeathed the residue of goods and personal estate after deducting all the debts and specific legacies.

RESIN, OR ROSIN, a widely distributed class of vegetable substances, characterized by being insoluble in water, soluble to different degrees in alcohol, ether, and liquid hydrocarbons, softening or melting at a moderate heat, and at a higher temperature burning with a smoky, luminous flame.

RESINA, a town in Italy, suburb of Naples, on the Gulf of Naples, close to Vesuvius, on the site of ancient Herculaneum. Set in a scene of great natural beauty, where fruits and flowers and vineyards abound. Industries include silk, glass, leather, oil and wire making. From spring onward visitors flock from all parts of the world. Ascent to Vesuvius begins here, and Pompeii is nearby. Pop. about 20,000.

RESIST, in dyeing, a material applied to cotton cloth to prevent the action of a mordant or color on those portions to which it is applied in the form of a pattern.

RESISTANCE, in electricity, the opposition offered by any conductor to the passage of an electric current. For unit of resistance, see OHM. In physics, a power by which motion or a tendency to motion in any body is impeded. If a weight be placed upon a beam which bears it up, the force which does so is the resistance opposed to its further descent. The resistance of the water, which is of greater specific gravity than a cork, causes the latter to keep the surface instead of sinking to bottom. The resistance of the air impedes the movement of a projectile. In mechanics: Solid of least resistance, solid of such a form as to experience, in moving in a fluid, less resistance than any other solid; having the same base, length, and volume; or, on the other hand, being stationary, to offer the least interruption to the progress of that fluid. In the former case it is the best form for the stem of a ship; in the latter, for the pier of a bridge.

RES JUDICATA, in law, a term meaning that the subject matter of an action has been already decided by a court of competent jurisdiction. A matter so decided cannot again be made a ground of action between the same parties.

RESOLUTION, in law, a solemn judgment or decision. In mathematics, the operation of separating any expression into factors; that is, the operation of finding two or more expressions such that their product is equal to the given expressions. Resolution of an equation: The same as reduction of an equation. In medicine, the passing away, without suppuration, of a tumor or of inflammation. In music, the process of relieving dissonance by succeeding consonance.

Resolution of a nebula: In astronomy, the demonstration by means of a very powerful telescope, that the diffused light of a nebula is really that of a multitude of exceedingly distant stars.

RESONANCE, OR RESONANCY, in acoustics, (1) Sound reflected by a surface less than 112.5 feet from the spot whence it originally traveled. The direct and the reflected sounds are confounded, but the one strengthens the other. Bare walls tend to be resonant; walls hung with tapestry are not so. (2) The increase of sound produced by a sounding board, or by the body of a musical instrument. In medicine, a more or less shrill sound heard by auscultation in the larynx or lungs of a person speaking, or of one affected with chest disease.

RESONATOR. an instrument invented by Professor Helmholtz for facilitating the analysis of compound sounds. It consists, in its simplest form, of a tapering tube or a hollow bulb, spherical or nearly so in form, having an opening at one side for the air, and a tube adapted to the ear at the other. When the instrument is fitted to one ear, the other being stopped, tones above or below the pitch of the resonator will be but imperfectly heard; but if a note be sounded correspondingly to its pitch the note will be intensified.

RESORCIN, a colorless crystalline compound prepared on a large scale by the action of sulphuric acid on benzene, and by the treatment of the resulting compound with caustic soda. It yields a fine purple-red coloring matter and several other dyes used in dyeing and calico printing, is a powerful disinfectant and deodorizer, and is used as a medical drug.